REVA UNIVERSITY

Bengaluru, India

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Approved by AICTE, COA and BCI, New Delhi. Accredited by NAAC.

4th International Virtual Conference on Advances in Computing & Information Technology (IACIT - 2022)

17th and 18th May, 2022

Organised by

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4th INTERNATIONAL VIRTUAL CONFERENCE ON

ADVANCES IN COMPUTING AND INFORMATION TECHNOLOGY

(IACIT -2022)

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MESSAGE FROM CHANCELLOR

The successful outcome of many national and international conferences held at REVA University generated an awe-inspiring response from our stakeholders, delegates, keynote speakers, and visitors. I am happy to understand that, as an extension to the conferences held before, the School of Computer Science & Engineering hosting a two-day international conference with a focus on "Advances in Computing and Information Technology [IACIT-2022]". The conference aims to exchange ideas between researchers, developers, industry leaders, and academicians on their latest innovations and findings, and to build collaboration for cutting-edge research and product development. The conference will enable us to bridge the gap between industry and academia.

I hope the conference will be an informative and pleasurable experience, and that each of you will seize this opportunity to establish an international research collaboration. I wish the conference all success and congratulate the teams from the School of Computer Science & Engineering and the School of Computing & Information Technology for their endeavor!

Dr.P.ShyamaRaju
Chancellor,
REVA University,
Bengaluru, INDIA.

MESSAGE FROM VICE-CHANCELLOR

I am delighted to note that the School of Computer Science & Engineering organizing atwo-day International Conference entitled "Advances in Computing and Information Technology [IACIT-2022]".Certainly,thistypeofconferencenotonlybringsalltheresearchers andstudentstooneplatform but also inculcates the research culture among the entire fraternity of Education inthecountry,thereby,contributingtothedevelopmentofthe nation.

I hope that this conference will certainly induce innovative ideas among the participantspaving way for new inventions and technologies in Computing and Information Technology. IcongratulatetheDirector,staff,andstudentsatthe School of Computer Science & Engineering and School of Computing & Information Technology for initiating the conductionofsuchaconference.

Iwishtheconferenceagrandsuccess.

Dr. M. Dhanamjaya
Vice-Chancellor,

REVA University,
Bengaluru, INDIA.

MESSAGE FROM REGISTRAR

The science and engineering research conducted in academic institutions, industry, R&DLaboratoriesandelsewhereplaysacriticalroleinraisingourstandardofliving,creatingjobs,improving health and providing for national security and development. I am extremely happy tonote that School of Computer Science & Engineering, REVA University are organizing a twoday International Conference entitled "Advances in Computing and Information Technology [IACIT-2022]".

Iamsurethattheconferenceofthistypewillinculcatethemuchneededresearchcultureamongthestudentsandteachersandtriggerinteractionsamongresearcherstoexchangetheideas of recent advances in the areas of Computing and Information Technology which will have the wayforthenationaldevelopment.

Iwishtheconferenceagrandsuccess.

Dr. N. Ramesh
Registrar,
REVA University,
Bengaluru, INDIA.

MESSAGE FROM DEAN, ACADEMICS (ENGINEERING) AND IQAC

Over the years the REVA University has become one of the hubs for providing technical and nontechnical education to the students. It has dedicated its efforts in bringing the latest developments in technology and other frontier areas. In the last few years, dramatic improvements have been made in the field of computer science and information technology and their applications. Scientists and engineers are creating various applications in all the fields of engineering and technology. Various research programs of REVA University addressing many issues and coming out with answers and solutions. REVA University addressing many issues by organising conferences and seminars. The present conference on "Advances in Computing and Information Technology [IACIT-2022]", is planned to bring the industry experts, scientists, and teaching fraternity to address the latest developments and discuss for the solutions. Also, it is very much useful to the students to understand and work further for their research with deliberations during the conference. I immensely happy and welcome all the delegates to this conference and wish the conference a grand success.

Dr. DVS Bhagavanulu
Dean Academics (Engineering) and IQAC
REVA University,
Bengaluru, INDIA

MESSAGE FROM DEANENGINEERING AND TECHNOLOGY

Curricula of both undergraduate and postgraduate programs at REVA University have been designed through acollaboration of alumni, academic, research and industry experts in order to bridge the gapbetween industry and academia as well as to inculcate innovation and leadership qualities.Research degree programs are aimed at design and development of solutions to contemporary problems in computerandengineeringtechnologiesorientedtowardshumanitydevelopment.Henceforth, organizing the platform for the collaboration of researchers on a common platform is worthwhile.

Thus, it gives me immense pleasure to welcome you to the Third International Conference "Advances in Computing and Information Technology [IACIT-2022]". This Technical International Conference will provide a prestigious international platform by bringing together local and overseas technical researchers and students to exchange their experienced knowledge and expertise issues relating to the dominating technology trends.

Dr. Sunilkumar S. Manvi
Dean Engineering and Technology,
REVA University,
Bengaluru, INDIA.

MESSAGE FROM DEAN(R&IC)

Research at REVA University is culture and to promote this, the university offers Ph.D. programs in Science & Technology, Arts & Humanities, Commerce & Management, PerformingArts, Legal studies, and Architecture. Dedicated faculty members and research scholars areundertaking research in cutting edge interdisciplinary research. Research circles mentoredby senior researchers provide guidance to young members and instill research culture in theschools.Theuniversityaspirestobecomeoneoftheuniversitiesknownforappliedresearchandhence encouragesdisseminationofresearchoutcomesthroughforumssuchasthisonebeingorganizedbyth eSchool of Computer Science & Engineering.

I congratulate the School of Computer Science & Engineering for organizing the international conference “Advances in Computing and Information Technology [IACIT-2022]” for the third successive year. I convey my best wishes tothe organizers and the participants and hope that the conference will open up new avenuestotacklesocietalissues.

Dr. B. P. Divakar
Dean, Research & Innovation Council,
REVA University,
Bengaluru, INDIA.

MESSAGE FROM DIRECTOR (IR & RC)

Internationalization is one of the niche areas at REVA University with numerous international students and wide range of state-of the art facilities to provide the best space to our international students as well as collaborators. REVA University is well known in the country and to some of the world nations. We at REVA University practice Science, Technology, Engineering and Mathematics (STEM) in a constructive manner. Computer Science and Engineering one of the well-advanced schools with repute at REVA University which clearly emphasizes on computer sciences and its advancements to give greater benefits and knowledge to the students.

Collaborations between academic and research organisations provide wide range of opportunities to the academicians as well as researchers. With these collaborative efforts, the 4th International Conference "Advances in Computing and Information Technology [IACIT-2022]"will provide the participants a great knowledge and take-home message in the relevant fields with amazing research topics and expert and experience speakers from different parts of the world. I congratulate the School of Computer Science & Engineering team for organizing the international conference in a series. *It's my pleasure to welcome you for this amazing, knowledgeable conference as a memorable event. Connect to your peers globally through this conference.*

Dr. P. Visweswara Rao
Director, International Relations and Research Collaborations
REVA University,
Bengaluru, INDIA.

MESSAGE FROM DEPUTY DIRECTOR

It's a great pleasure for me to extend a welcome to all of you who are participating in IACIT-2022, the 4th International Conference on Advances in Computing and Information Technology, which is being held by REVA University-Bengaluru, Karnataka.

In this conference we bring together researchers and practitioners from academia, industry, and government to exchange their research ideas and results and to discuss the state of the art in the areas of the conference in the Computer Science and Information Technology. The conference also offers an excellent opportunity to exchange new results and challenges. Topics include current information and communication technologies, the Internet of Things, big data, cloud computing, and innovative and promising applications in automation and process management. Emerging application fields such as logistics, intermodaltransportation systems, sustainable healthcare systems, and green automation are also included.

I would like to thank the program chairs, conference organizing committee, special session organizers, and the members of the program committee for their hard work. We hope that IACIT 2022 will be successful.

Dr. Ashwinkumar U M
Deputy Director, School of Computer Science and Engineering,
REVA University,
Bengaluru, INDIA.

KEYNOTE TITLES WITH PROFILES

Keynote 1

Topic:Reliable Internet Connectivity in Harsh Tropical Environment with Low Altitude Platforms

Speaker:Prof. Dr. Rosdiadee Nordin

Date: 17/05/2022

Time: 10:00 a.m. to 11:00a.m.

Venue: IACIT Virtual Conference

Abstract: Despite the massive Internet of Things (IoT) advancements that have enabled autonomous real-time monitoring for the past few years, these IoT systems face several wireless communication challenges, particularly in rural and harsh tropical environments. The deployed wireless network for the IoT systems should self-organize into mesh networks, relay data to a central station, and transport a massive volume of collected data across long distances at reasonably high data rates. Moreover, the deployed system must consistently send data to the central station while considering the harsh terrain and climate conditions. Unfortunately, no all-purpose single wireless system can meet all the requirements above. This keynote aims to address the unique challenges that arise from the harsh environment when gathering data from sensors spread across a large area of Chini Lake, a UNESCO biosphere lake located in East Malaysia. The keynote will conclude with discussions on how the research community can be part of the solutions to help the rural community to gain equal access to the Internet, which is now viewed as the 'Fourth Utility' in the current age of Industrial Revolution 4.0 society.

Speakers Profile: Prof. Dr. Rosdiadee Nordin is a Professor in Wireless Communications from ***Universiti Kebangsaan*Malaysia** (**National University of Malaysia**). He incorporates practical industry requirements and uses transdisciplinary research approaches to solve real-world problems through his wireless research activities. He is the recipient of the Leadership in Innovation Fellowship, a technopreneur program under the Royal Academy of Engineering, United Kingdom, in 2021, and the recipient of Top Research Scientists Malaysia (TRSM), a prestigious award under the Academy of Science Malaysia, in 2020. He is a former Vice-Chair and an active member in the Science Communication Working Group under the Young Scientists Network (YSN) - Academy of Sciences Malaysia (ASM)

Keynote 2

Topic:Big Data Analytics

Speaker:Dr. Jake Libed

Date: 17/05/2022

Time: 02:00 p.m. to 03:00 p.m.

Venue: IACIT Virtual Conference

Abstract: Big data plays a significant role in today's day to day living. Data analytics which extracts or referred to as "mining" of knowledge from large amounts of data is a necessity towards finding interesting patterns and can be very helpful in providing analysis as it utilizes the use of established mathematical and statistical model that provides a more reliable and robust prediction. The topic will involve the discussion on the importance of data analytics, as well as to identify key significant areas of its application. Also, a simulation procedure of a data analytic technique to be implemented in a real world application will be part of the discussion to provide the audience with a clear picture on the importance of data analytics in our daily operation. Next to this is the focus on the current issues and challenges that it encounters in the implementation of data analytic techniques with the suggestion on how to address those difficulties. Furthermore, a presentation on the evaluation tools or procedures currently utilized for the analysis of results of a data analytic method is also part of the topic in order to assess and provide solid understanding on the meaning of the obtained value for every data analytic procedures. And lastly, the discussion will also examine on the future of data analytics in our daily lives and business operations as well as on the commonly used platform in data analytics will be supplied.

Speakers Profile: Previously served as College ***Dean of Information Technology***at **the National Teachers College, Manila, Philippines**. He is a graduate of BS Computer Science from Emilio Aguinaldo College and finished his Master of Science in Information Technology degree from Rizal Technological University, moreover pursued his Doctor in Information Technology from Technological Institute of the Philippines . His academic experience spans 13 years at the undergraduate and graduate levels. His research interest includes IT security and data analytics. He has authored several publications and has presented various research topics in international IT conferences.

Keynote 3

Topic: Micro Sensor Based Explosives Detector

Speaker:**Dr. Nitin Sukhdeorao Kale**

Date: 18/05/2022

Time: 09:30 a.m. to 10:00 a.m.

Venue: IACIT Virtual Conference

Abstract: Microsensor basesd Explosives Detector Selective and sensitive detection of explosives is very important in countering terrorist threats. Detecting trace explosives has become a very complex and expensive endeavour because of a number of factors such as the wide variety of materials that can be used as explosives & the lack of easily detectable signatures. Nanosniff has developed a MEMS Microheater based Explosives Trace Detector. Its Physics based approach uses Micro Differential Thermal Analysis (Micro-DTA) to distinguish explosives from non-explosives. The ETD is ably supported by a High-Speed & High-Sensitivity Electronic Instrumentation; & with intelligent data processing algorithms.

Speakers Profile: Dr. Nitin S. Kale obtained his M. Tech from Visvesvaraya National Institute of Technology (VNIT Nagpur), in 1999, and his Ph. D. from IIT Bombay in 2007.

During 2007 – 2008, he worked as a Principal Engineer at Taiwan Semiconductor Manufacturing Company, on the 32-nm High-K Metal Gate project.

In 2009 he joined the IIT Bombay Nano manufacturing unit. In this role he was responsible for the day to day operations and management of the Rs 200 Crore IIT Bombay Nanofabrication Facility.

Since June 2011, he is working as its Chief Technology Officer. In this role he is responsible for the R&D in the area of fabricating microcantilever sensors, microheaters; and developing instruments for detecting proteins, cardiac-markers and antibodies.

He has developed several MEMS Products (Devices & Instrumentation), which include:

1. Instruments: (i) Omnicant; (ii) Omnicant Bio;

2. MEMS Devices: (i) Piezoresistive Microcantilevers; (ii) Microheaters;

(iii) Microheaters with IDE's.

He has demonstrated the Proof of Concept of detecting Cardiac Proteins (hFAbP, Myoglobin etc) using Piezoresistive Microcantilevers, Ultrasensitive electronics, & a Custom-made Liquid-Cell.

He has published about 30 articles with very good citations in his research area.

Best Wishes
School of CSE
REVA University

REVA
UNIVERSITY
Bengaluru, India

Rukmini Knowledge Park, Kattigenahalli,
Yelahanka, Bengaluru - 560 064
Karnataka, India.

Ph: +91- 90211 90211, +91 80 4696 6966
E-mail: admissions@reva.edu.in

/REVAUniversity

www.reva.edu.in

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Analysing Vegetation and wetland cover of a district using GEE Python API and displaying the analysis in a Flask web application

Dr. Deepthi Murthy
School of Electronics and Communication Engineering
Reva University
Bangalore, India
deepthimurthy@reva.edu.in
Golakoti G V P Sai Ram
School of Electronics and Communication Engineering
Reva University
Bangalore, India
sairam.g581@gmail.com
Ch Cherishnav Reddy
School of Electronics and Communication Engineering
Reva University
Bangalore, India
ccreddy2214@gmail.com
Kadali Satyendra
School of Electronics and Communication Engineering
Reva University
Bangalore, India
kchandu4802@gmail.com
Golla Harish
School of Electronics and Communication Engineering
Reva University
Bangalore, India
harishrajeswari06@gmail.com

Abstract—Geographical analysis is one of the main applications of remote sensing, such as analyzing the vegetation and wetland areas. In general, Vegetation means a group of the same or different plant species covering a vast area. Vegetation includes different types of plant spices and geographical characteristics. Vegetation is classified based on life forms, structure, spatial extent, and botanical differences. In most tropical rainforests strenuous occurrence of deforestation has been seen. At present about thirty-one percent surface of Earth is spread by forests. Wetlands are the areas that contain a huge amount of water. Wetlands include rivers, lakes, ponds, tanks, etc. Evaluating and locating water bodies such as lakes, ponds, rivers, etc. along with vegetation areas is done by remote sensing. To monitor water bodies and vegetation areas remotely, remote sensing is very helpful. The images which are obtained through remote sensing are analyzed to determine the vegetation area and wetland area. Google Earth Engine is user friendly and easily accessible platform for remote sensing data. Google Earth Engine is helpful to access satellite data. Google Earth Engine contains many multi-spectral imaging satellites data such as Landsat, Sentinel, etc. Using GEE Python API, satellite data is analyzed. Forecasting can be used to predict the subsequent analysis of a certain district's area. A web application can be used as the user interface to display the analyzed and forecasted results.

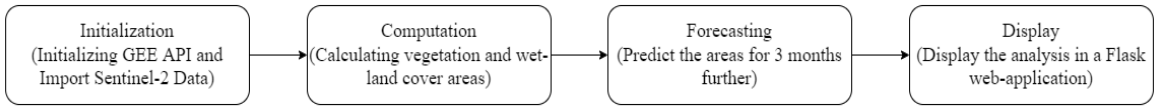
Keywords—remote sensing, google earth engine, vegetation cover, wetland cover

I. INTRODUCTION

Due to massive population growth and increased usage of land significantly led to environmental losses such as degradation of forests, the occurrence of soil erosion, and biodiversity losses. This phenomenon in the environment brought great pressure on human life. As we can see in our day-to-day life, the deforestation rate has rapidly increased. On the other hand, we can also see that the groundwater level is severely reduced. Due to increased mining activities, vegetation and surface water are extremely affected which in turn results in reduced vegetation area and wetlands. Remote sensing can be used to monitor and analyse these activities which can be used to prevent further loss. The analysis of vegetation cover and wetland cover can be made on a selected area of interest (AOI). An area of interest can be any geographical boundary like a city or a district. The district boundaries of India are considered as areas of interest in this project. Google Earth Engine (GEE) is a powerful tool that comprises remotely sensed data from various satellite imaging sensors such as Landsat, MODIS, and Sentinel. The GEE Python API is used in this project to analyse and forecast the data. Python is used to develop a web application to display the analysis and forecast results. Sentinel-2 is a multispectral imaging sensor that perceives the data of the earth in a wide range of spectrum bands and is available through GEE API. It consists of different bands to analyse vegetation and wetland cover which are the two main objectives of this project. A forecasting machine learning model built with Python is trained on the data to predict the analysis for further months. Flask module in Python is used to display the results of the analysis on a web application on a local server.

II. LITERATURE REVIEW

In 2007, An overview [1] was published by Ranganath R on applications of Remote sensing. His research article includes details about different sensors used for remote sensing with their host satellite. Spectral bands, spatial resolution, swath, and



other specifications of the sensors are also tabulated. The article also gives an overview of basic concepts like Signatures and remote sensing techniques.

Indersheel analysed the deforestation in Maharashtra [2], India using the satellite image obtained through remote sensing in 2021. He used the multispectral data for the analysis. The total area of study is 107665.5 hectares. After performing image processing and image enhancement methods, he analysed that the area of forest cover is 76.740.32 hectares. With the study, he concluded that there is a significant decrease in water bodies percentage and forest cover.

Ila Chawla, a Water Researcher at IISc inscribes a review on applications of remote sensing on water security in 2020 [3]. She summarizes the role of satellites to evaluate water security through remote sensing. She mainly focuses on the three characteristics of water that are quality, quantity, and extremes. To assess the quality of water, she considers the Chlorophyll-a, TSS, SDD, and CDOM parameters. She gives the outline of the application of remote sensing to identify streamflow, water storage bodies, and reservoir monitoring.

Figure 1 Block diagram

Yan Gao with the team reviewed the role of remote sensing in forest degradation in 2020 [4]. In the article, they listed the definition of forest degradation and the limitations of remote sensing data. They also listed the disturbances for forest degradation.

GEE has a wide range of applications as reviewed by Lalit Kumar [5]. He presents a summarized review of the applications of GEE across different categories. This includes categories like vegetation and landcover mapping, and agricultural and disaster management applications of GEE.

III. METHODOLOGY

A. Block diagram

The block diagram in figure 1 represents the methodology for the analysis. After initializing the API, required data is computed in Python, and the results are forecasted and displayed in the Flask application.

1) Initialization

This step starts with initializing the Google Earth Engine Python API and authenticating it with the credentials to get started. After initializing the API, The Sentinel-2 image collection is imported for the area of interest in this case certain district data.

```
import ee
ee.Authenticate()
ee.Initialize()
image_collection=ee.ImageCollection("COPERNICUS/S2_SR")
```

2) Computation

The imported image collection is grouped by the image's captured year and month. Normalized differences for vegetation and water are calculated. The normalized difference images are converted into a gif file to illustrate. The areas of the vegetation and wetland are computed and stored in a data frame.

3) Forecasting

Vegetation and wetland cover areas are then forecasted using a Forecasting Machine Learning Model for further 3 months from the last data point. This step returns the forecast results and time-series graphs for better representation.

4) Display

A Flask-based web application is used as an interface to provide the inputs and display the results. The Flask application runs on a local server and is used to take input from the user and display the appropriate results.

B. Data

The data used for the analysis is Sentinel-2 Level-2A data. Sentinel-2 is a multi-spectral high-resolution instrument sampling in 13 different spectral bands ranging from 443nm to 2190nm labeled as B1 through B12 with 4 bands at 10m, 6 bands at 20m, and 3 bands at 60m spatial resolutions. It is used for Copernicus Land Monitoring. Sentinel-2 Level-2A is one of the products of Sentinel-2 data with Bottom-Of-Atmosphere reflectance and other classes for different clouds. The data is available from March 20018 to April 2022 (as of this article).

C. Flow Cart

Figure 2 shows the detailed flow graph. When accessed, the Flask application displays a form to take the district name from the user. Geo-JSON is a type of data that contains geographical information such as borders, landmarks, and other user-defined data which are identified by the coordinates. The border of the district is used as the feature in this project. The user-provided district's border feature is filtered from the Geo-JSON data and is converted to a GEE API supported feature object and the total area covered by the border is calculated. The Sentinel-2 data from GEE API is imported as an image collection and is filtered for the respective district with a cloud cover of 30% and a mean image for each month is computed. The algorithm used to identify the vegetation and water body is Normalized Difference. When computed, normalized difference returns values in the range of -1 to 1.

Normalized Difference Vegetation Index (NDVI):

NDVI is used to identify the vegetation cover. NDVI is a dimensionless value that represents the reflectance of vegetation cover. It is determined from the reflectance values of the vegetation cover in the red spectrum (RED) with a wavelength in the range of 664.5nm to 665nm and the Near-Infrared band (NIR) with a wavelength in the range of 833nm to 835.1nm [6]. NDVI is given as equation (1).

$$NDVI=(NIR-RED)/(NIR+RED) \quad (1)$$

For Sentinel-2 data, band B8 of 10m spatial resolution represents the NIR band with a central wavelength of 832.8nm and bandwidth of 106nm, and band B4 of 10m spatial resolution represents VIS in the red spectrum with a central wavelength of 664.6nm and bandwidth of 31nm. Any NDVI value when computed is less than or equal to zero, it represents the water cover. Values from 0.1 to 0.3 represent the presence of stone and snow and values greater than 0.3 represent vegetation. The larger the value, the denser the vegetation cover.

Normalized Difference Water Index (NDWI):

NDWI is used to identify the wetland cover. NDWI is a dimensionless value that represents the reflectance of wetland cover. It is determined from the reflectance values of the vegetation cover in the green spectrum with a wavelength in the range of 559nm to 560nm and the Near-Infrared band with a wavelength in the range of 833nm to 835.1nm [7]. NDWI is given as equation (2)

$$NDWI=(GREEN-NIR)/(GREEN+NIR) \quad (2)$$

For Sentinel-2 data, band B3 of 10m spatial resolution represents the green spectrum with a central wavelength of 559.8nm and bandwidth of 36nm, and band B8 of 10m spatial resolution represents the NIR band with a central wavelength of 832.8nm and bandwidth of 106nm. Values greater than zero represents water bodies.

The NDVI and NDWI algorithms are used on all the images in the imported Earth Engine Image Collection. After identifying the vegetation and wet-land cover, vegetation and wet-land cover areas are calculated using the Google Earth Engine Python API functions in square kilometers for all the images in the collection. Area values of each image are stored in a Pandas data frame with the date of the image as the index and a time-series graph is plotted for the display.

The data in the data frame is used to create a Machine Learning model to predict the vegetation and wet-land cover areas for further 3 months and plot the prediction graphs. The recursive Autoregressive Forecasting model [8] is chosen as the machine learning model for the forecast and Random Forest Regressor is passed as the regressor for the forecasting algorithm with 6 lags (fig 3).

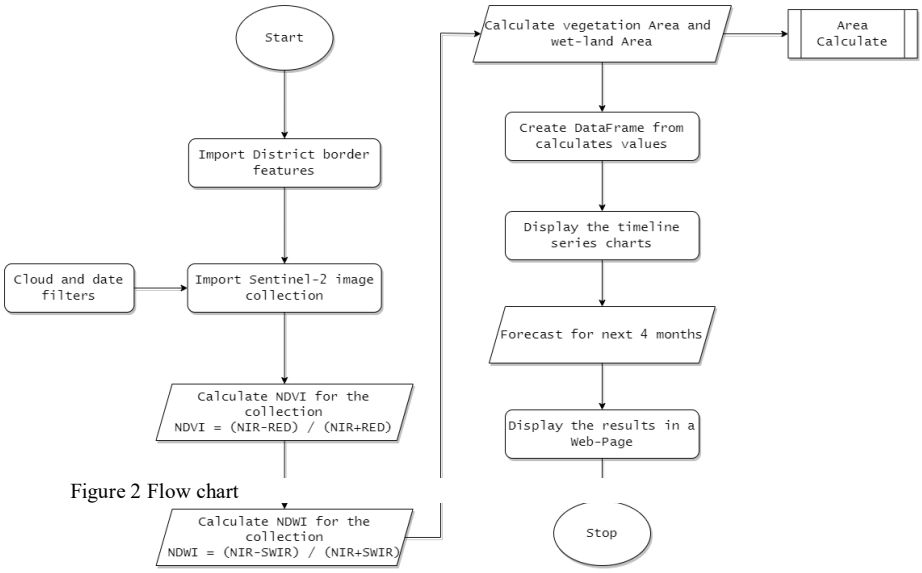


Figure 2 Flow chart

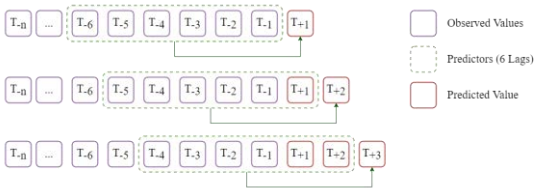


Figure 3 Recursive Multi-step Forecasting with 6 lags

All the resulted values and plots are then displayed on the display page of the Flask-based web application.

IV. RESULTS

The Flask web application is designed to make the user choose the district for the analysis and display the results on a separate page. The web application is developed in HTML and CSS for the home and result display page as the frontend and Flask is used as the backend for routing and computing required analysis. It runs on a local development server to provide the service. The Home page of the application consists of a simple form with a drop-down with the districts to select from and a button to submit the form as shown in figure 4.

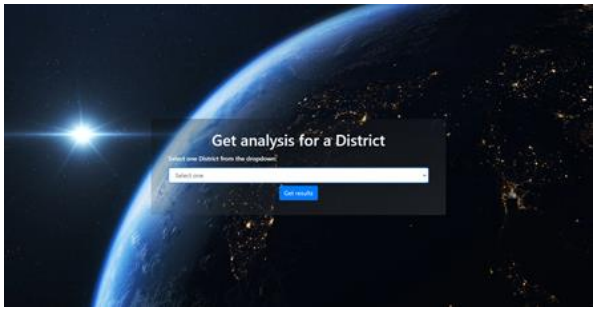


Figure 4 Application homepage with form to select district

The below screenshots are the results when East Godavari is selected as the district. When submitted, the application starts computing the results for the district and displays a loading animation till the output is generated as shown in figure 5.

Figure 5 Application loading status

After computing, the results display page shows the name of the selected district along with the total area of the district in square kilometers and a recent true-color image of the district (fig 6).

Figure 6 True color image of the district with total area (Sq.KM)

The changes in the vegetation cover and wetland cover are presented as gifs with the respective areas as shown in figure 7.

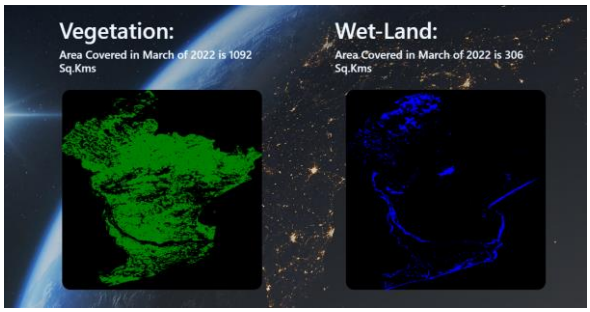


Figure 7 Result with recent vegetation and wetland cover areas and their representation

Figure 8 displays two plots representing time-series of vegetation (top) and wetland (bottom) covers with the y-axis representing the area in square kilometers and the x-axis representing the timeline.

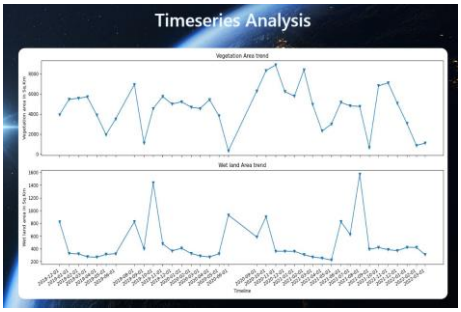


Figure 8 Timeseries graphs for vegetation and wetland covers

Figure 9 represents the forecasting analysis with the left plot representing the vegetation cover forecast and the right plot representing the wetland cover forecast. The train and test data are represented by blue and orange lines respectively and the green line represents the predicted values. Also, the created model is used to predict the areas for successive 3 months from the last data point.

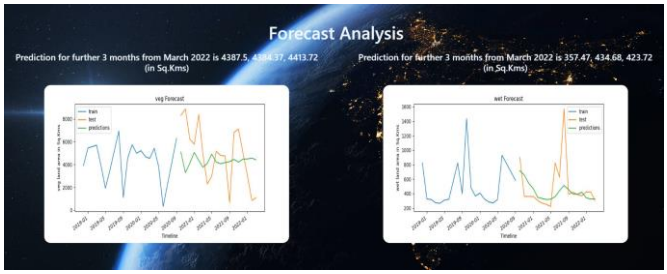


Figure 9 Forecasting for vegetation and wetland covers

We can observe that there are outliers present in the data from figure 9 like the values almost 0 which cannot occur in real-time. This is due to errors while filtering the image collection, we may obtain images with partial coverage of the AOI and cloud parameters.

V. FUTURE SCOPE

- This project can be carried on to analyze mineral contents using Python and GEE and display it on the webpage.
- Extending the area of interest from districts to other boundaries can be implemented.
- Outliers obtained by data filter errors like partial image and cloud cover handling will yield better results.

VI. CONCLUSION

This project is able to analyze the vegetation and wetland covers of a district with the help of Google Earth Engine API and predict the areas for the successive 3-month period with a Flask-based web application as the interface. Generally, forecasting is used to predict the weather and climatic conditions of an area. Forecasting can also be used to foresee the vegetation and wetland changes. Using a Flask-based web application as an interface helped the integration of the analyzing and forecasting code in Python with the webpage.

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KYC Using Deep Learning

Sui Mervin Maher, Department of Computer Science, REVA University, mervinjane@gmail.com and

Dr. Prasanth T, Associate Professor, REVA University, prasanth.t@reva.edu.in

Abstract— Know Your Customer (KYC) is a preventive measure used by many sectors such as bank, telecommunication, cryptocurrencies, etc. KYC allows a user to link their business information along with their Government issued ID's. This system focuses on creating a system which can automeatically verify all the details of the Government issued ID's and verify them. Tensor Flow, Keras and object detection model will help the system to detect all the objects correctly on the Government issued ID's and after that it can verify the integrity of the ID's. Face Detection system would be used to check if the image on the ID matches the person doing KYC. If any suspicious behavior is caught then a manual KYC check request will be sent. The coding for the system will be done in using Python Language and also use Flask framework. This system will allow companies to perform KYC automatically without the supervision of any human which will make the task of KYC easy and quick.

Keywords-component; KYC, Deep Learning, Face Detection

1. INTRODUCTION

KYC is a process of linking clients Government ID details with their respective accounts. The clients provides their Government ID's and those details are checked and accordingly the account is verified for KYC. Using Deep Learning, we can set up a face detection model along with object detection model to analyze the Government issued documents and to verify their integrity and compare it. Images of various dimensions, clarity, position are filtered using various models and then authentication is checked. The process of KYC is done automatically but manual authentication is provided as needed. KYC is an upcoming method of verification which can be used in various fields such as Banking, Cryptocurrencies, Government websites etc. which requires verification of Government IDs.

2. LITERATURE SURVEY

1. In [2018] Prakash Chandra Mondal etal., " Transaction Authorization from Know Your Customer (KYC) Information in Online Banking" A KYC application is proposed for authorization of information in online banking. KYC is done to authorize transactions before any financial transaction is done from the online banking application using Challenge Question i.e. CQ. Security Questions are examples of Challenge Question (CQ). Man in the middle type of attacksare not possible for this system. The use of additional hardwares made the cost of the application high.

2. In [2018] Prakash Chandra Mondal etal., " Know Your Customer (KYC) based authentication method for financial services through the internet" developed an effective system capable of authenticating services relating to finance which can also be accessed through internet. The use of Dynamic KYC is basedon MultiFactor Authentication (MFA) method which ensuresthat all the accesses over the internet for the financial services are secured. It can be used on private and public devices. This system also uses additional hardware which increases it's cost.

3. In [2019] Marc PIC etal., "Remote KYC: Attacks and Counter-Measures" They developed a system to do analysis of the user documents for securing them from different types attacks which are traditional and also the new ones. Examples of the attacks are Complete Photography Replacement, Face Swapping and Face Morphing. This system is very accurate in detecting any false matches between two images which are different.

4. In [2019] Piyush Yadav etal., "Transforming the Know Your Customer (KYC) Process using Blockchain" Distributed Ledger Technology is used as a new solution for the KYC process. This system reduces the cost of traditional KYC

process. It also saves a lot of time for the the completion of this KYC process thereby being very time efficient. Payment wallets are yet to use this type of systems.

5. In [2020] N. Sundareswaran etal., "Optimised KYC Blockchain System". Advanced Encryption Algorithm is used to build the KYC system which works on the concepts of Blockchain Technology. This system reduces the need to store the data by 20%. But the downside of this KYC blockchain system is that another encryption techniques might be more beneficial.

6. In [2020] Abdullah Al Mamun etal., "Secure and Transparent KYC for Banking System Using IPFS and Blockchain Technology". A hash value is generated when a user opens a bank account. The user is asked to complete the KYC process to generate this hash value. This is done using the InterPlanetary File System network and the sharing of this system is done using blockchain technology.As the hash value is used to open banks in multiple banks, this system makes the work of user easy and simple. Thereby this sytem is very time efficient. It also reduces the workload of the user and the cost that the user has to spend over the KYC process. However, as this system is capable of handling large amounts of data, It is not suggested to use this system for single bank accounts.

3. LITERATURE SURVEY RESULTS

After literature survey on various KYC and Deep Learning Projects, various advantages and disadvantages of all the projects are summarized. Most of the existing systems for KYC are not having automatic authentication. Because of manual verification in the existing systems for the process of KYC, the systems take a lot of time to process the data of the user and to verify it. Also they require more time for authentication as manual verification is done. This increases a lot of time and a lot of cost for the existing systems.

After literature survey we need to propose a KYC system such that it can handle automatic verification using object detection and face detection models. Also it will save time and cost as no manual authentication is required.

4. SYSTEM ARCHITECTURE

In this chapter we have listed the system architecture of KYC Using Deep Learning and the working of the KYC system.

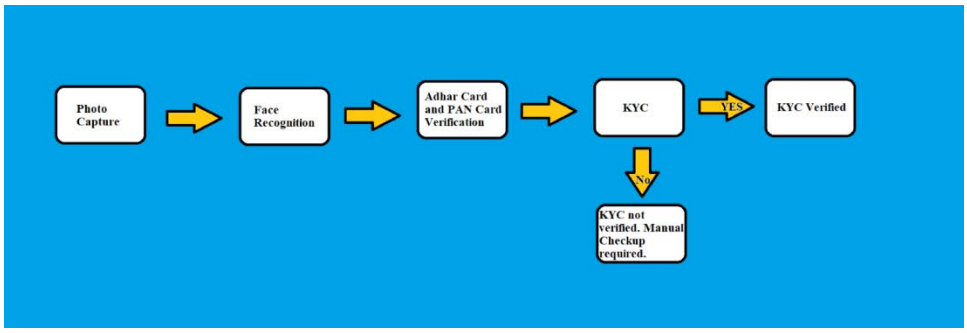

Fig1.System Architecture of KYC System

The KYC system starts with a photo capture. The user will be asked to capture their photo and then fill their Government id details i.e. Aadhar card and PAN card. Image on the Government ID will be fetched using Face Recognition model and it will be compared with the Photo captured at first. The object detection model will be used to extract the details from the Government IDs and verify it with the details manually entered by the user. Based on the verification of both the face recognition model and object detection model the system will give its results. If both the models return the value true then the KYC is verified else the KYC is not verified and manual checkup is required.

5. PROPOSED SYSTEM

In theproposed system. a KYC is used to authenticate the details of the user by comparing it with the details given on their Government IDs i.e. Aadhar card and PAN card. Different methods are used for Face Detection, Object Detection and Image Processing. All these methods are used to compare the details. If all of them return the value TRUE then KYC is verified else KYC is not verified and manual checkup is required.

6. METHODOLOGY

We are using DeepFace library for Face Recognition phase. DeepFace library provides us with many pre-trained models which can be used for image processing. For retaining the highest accuracy while also keeping in mind the same platform of programming, we use FaceNet and VGGFace models. FaceNet divides an image into 128 vectors numbers which represents most important features of a face. VGGFace has 3 stages i.e. Convolution, MaxPool and SoftMax. Convolution adds elements to neighbouring Kernels. MaxPool provides maximum values of the patches. SoftMax changes vectors of numbers to probability. In Face Recognition phase, there are 3 stages i.e.FaceAttribute, FaceRecognition and FaceVerification. FaceAttribute is used to retrieve the value of gender using the face attributes. FaceRecognition is used to identify the details of the face of the captured photo by comparing it with the photos in the image database. FaceVerification is used to verify two different images of the same person.

After finishing face detection, we are performing object detection for the Government IDs i.e. Aadhar Card and PAN Card. The data has been split between the training and the testing data and the model is trained using tensorflow. Pre-trained model SSD ResNet50 V1 FPN 640x640 (RetinaNet50) is used. This is an object detection model which allows us to create our custom object detection model. After training the data, we will use the custom model and test it on our system. First a random Aadhar card and PAN card to check if it is verified or not. After verification, the image will be skewed in order to rotate it to be properly aligned. After aligning, the image is converted into black and white so that the characters can be easily detected better. At last Object Character Recognition is performed to extract out the characters from Aadhar Card and PAN Card. If there is any error in matching the fields then the system will return FALSE else it will return the fields.

7. RESULT

In this chapter we have listed the result of the KYC System.

Result-1: Front-end

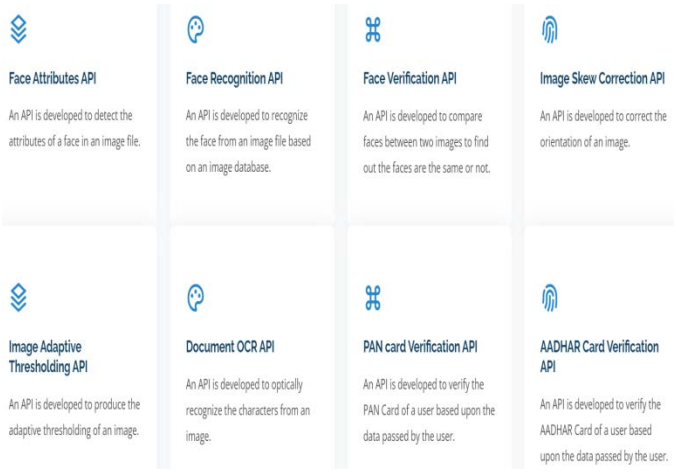

Fig 2. Front-end of KYC system

The front-end of the system is created using html, css and javascript. The KYC system includes 8 different API's which includes functionality for the entire KYC process.

Result-2: Face Attributes API

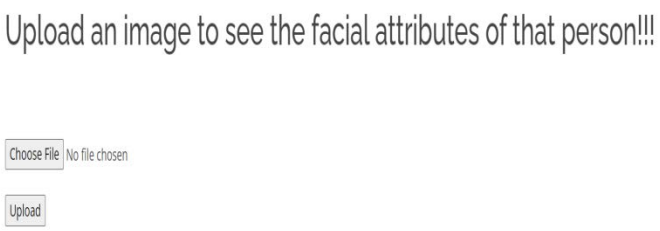

Fig 3. Face Attributes API

Face Attributes API will detect all the attributes such as age, race, gender, etc from the uploaded image which will help us get key features of the person.

Result-3: Face Recognition API

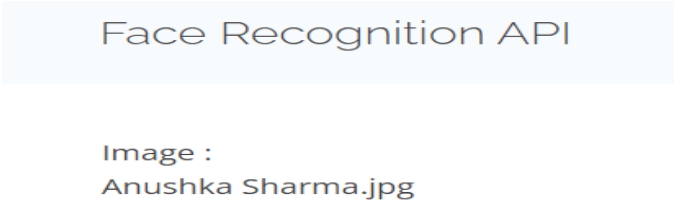

Fig 4. Face Recognition API

Face Recognition API will detect the name of the person who's image is uploaded comparing the image with other images of the same person in the database.

Result-4: Face Verification API

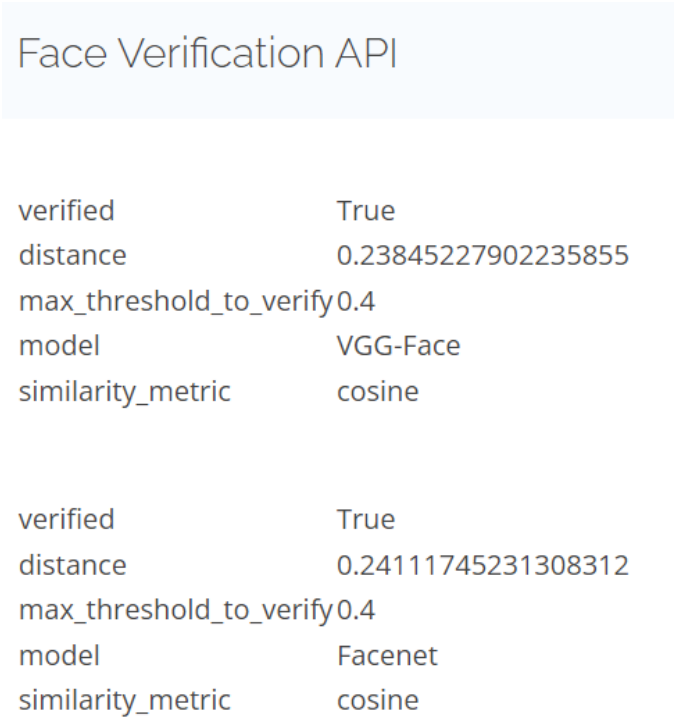

Fig 5. Face Verification API

Face Verification API compares two images and checks if both the images are of the same person or not. If both the images are of the same person then the system will return verified field as True else it will return False.

Result-5:Image Skew Correction API

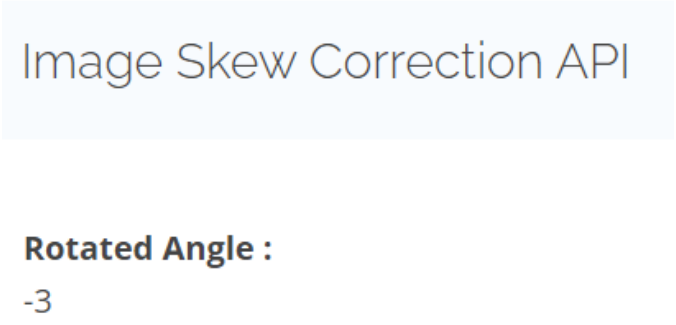

Fig 6. Image Skew Correction API

Image Skew Correction API will perform rotation of the image in such a way that the image fits perfectly on the screen which will make the work of KYC system easy. It will also display the angle by which the image is rotated.

Result-6: Image Adaptive Thresholding API

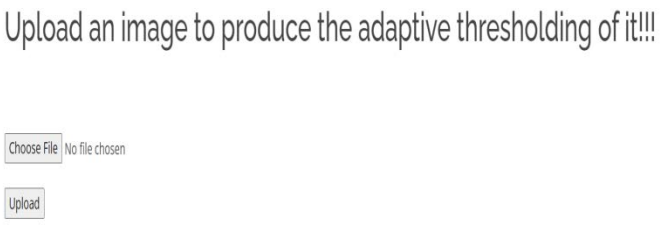

Fig 7. Image Adaptive Thresholding API

Image Adaptive Thresholding API takes the rotated image from the Image Skew Correction API and converts the image into a black and white image so that the system can retrieve the text from the image easily

Result-7: Document OCR API

Fig 8. Document OCR API

Document OCR API will extract all the text from the image which will be used to verify Government ID's for KYC.

Result-8: PAN Card Verification API

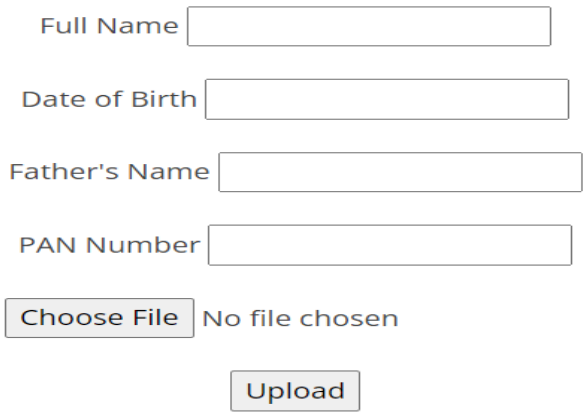

Fig 9. PAN Card Verification Form

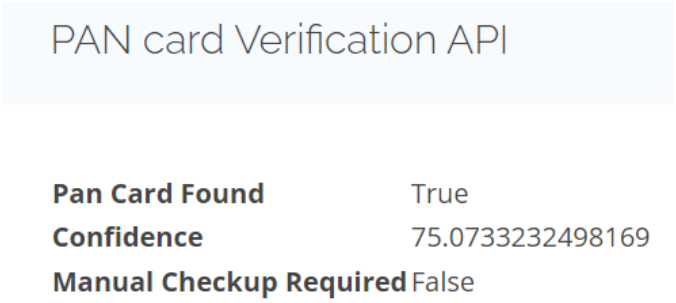

Fig 10. PAN Card Verification API

PAN Card Verification API is used to verify if the PAN Card is valid or not. The user will be asked to fill a form and upload the image of their PAN card. If the details entered by the user matches with that retrieved by the KYC system then the system would say manual checkup is not required meaning KYC verified, else manual checkup is required.

Result-9: Aadhar Card Verification API

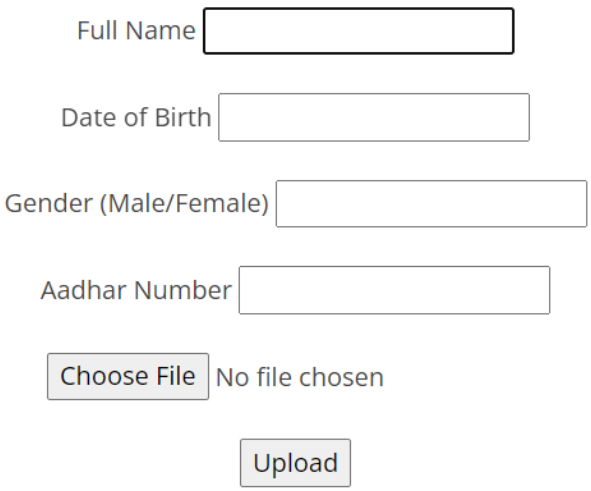

Fig 11. Aadhar Card Verification Form

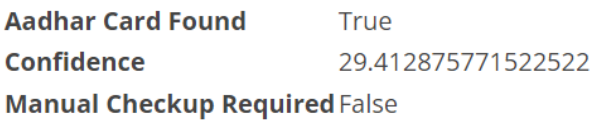

Fig 12. Aadhar Card Verification API

Aadhar Card Verification API is used to verify if the Aadhar Card is valid or not. The user will be asked to fill a form and upload the image of their Aadhar card. If the details entered by the user matches with that retrieved by the KYC system then the system would say manual checkup is not required meaning KYC verified, else manual checkup is required.

Conclusion

In the proposed system, aKYC system is created using various different Deep Learning models such as face detection, object detection, image processing, etc. This system would provide automatic authentication of the Government issued id's which could save time and cost of manual authentication though for some rare cases manual authentication would be provided if necessary.As it reduces the time for KYC, more people could benefit out of it by being able to get their documents verified faster than before which could also portray better image of the respective application or the website.

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Cross Platform Online Auction System

Suhasini N
School of Computer Science And Engineering
REVA University
Bengaluru, India
suhasini.n@reva.edu.in

Rahul Kumar Jha
School of Computer Science And Engineering
REVA University
Bengaluru, India
R18CS320@cit.reva.edu.in

Rinjan Chatterjee
School of Computer Science And Engineering
REVA University
Bengaluru, India
R18CS329@cit.reva.edu.in

Saikumar Kamthane
School of Computer Science And Engineering
REVA University
Bengaluru, India
R18CS359@cit.reva.edu.in

Abstract*—An online auction which is also known as e-auction (electronic auction) is basically an auction which is conducted over the internet. These auctions can include a variety of items on which people bid and the person with the highest bid wins. As of today, the largest such site is eBay which was the first site which supported P2P (Person to Person) auctions. However, with time the site UI (User Interface) is quite outdated and does not have proper support across all platforms. This implementation hereby uses Google's latest Flutter Software Development Kit which provides native widgets and similar performance to native apps and uses a single codebase to run across different platforms such as Android, IOS, Web, Windows, Linux, and Mac. This cross-platform auction system can be accessed by all users regardless of the device they use and will provide the best performance and synchronized UI and any user can participate both as a buyer and a seller.

Keywords*—Cross Platform, Flutter, e-Auction.

I. INTRODUCTION

Online auctions, like offline auctions in general, can be organized in a number of different ways, including ascending English auctions, descending Dutch auctions, first price sealed-bid, Vickrey auctions, and more.[4] The extent and impact of these auctions were boosted even more by a tremendous rise in Internet users, which was unanticipated.[5] One of the key reasons for this rise is that these auctions break down traditional barriers such as geography, presence, time, space, and target audience.[5] This increase in accessibility has also made it much easier to engage in illegal activities during an auction.[6] In recent years such kind of auctions have constituted of around 30 to 40 percent of all online e-commerce due to rapid increase in popularity.[7] Business to business (B2B), business to consumer (B2C), and consumer to consumer (C2C) auctions are all types of online auctions.[8] There are multiple number of platforms present for online auctions but most of them are limited to being web based and in some cases are available for Android or IOS. Furthermore, technological stack used by them have become outdated and there is no proper similarity between there UI across all platforms which may prove as a hinderance for some users. This solution aims to sort these issues and provide a newly built platform using Flutter framework which is provides tools for fast and effective development and debugging and a single codebase can be used for development across all well-known platforms. Users will be provided with options to sign-up or login and after logging in they can view all current or upcoming auctions which can be sorted by categories. They can also list items on auction portal and a nominal charge of 1% will be charged by the platform of sale price of the item. Due to use of Flutter performance will be identical across all platforms with utmost precession.

II. LITERATURE SURVEY

Over time, online auctions have become a common e-commerce transaction method. Because eBay is the world's largest online marketplace, it's an intriguing case study since it offers researchers to determine online auctions using collected from actual individuals and transactions. In this paper, we examine concerns with large online auction platforms in depth.

In recent years, the development of the World Wide Web has led to a rise in the number of online public auctions. One of the hallmarks of online auctions is that they require many buyers and sellers to be effective. As a direct result, auction sites with a massive volume of visitors generally have an advantage over those with a low volume of visitors. As a result, consumers and sellers become even more polarized towards a specific site. In several online and telecommunication applications involving interactions among multiple entities, which known as the network effect. While it is widely acknowledged that this effect raises the value of the entire system, it has not been thoroughly modelled or evaluated.[9] Popular auction platforms face an issue of inconsistent UI across different platforms as each one is developed using a different technological stack and there might be different issue with each of them which have to be resolved separately which requires multiple developers of different proficiencies and significantly increases time consumed even when a simple feature is added. Another issue that bidders may confront is the issue of exposure. When purchasers want a bundle of commodities but may only engage in single-item auctions, exposure difficulties arise, according to Bykowsky et al. 1 For Instance, if Alice rates a gaming console at $200, a video game at $30, and both a console and a game at $250, she needs to figure out how much of the $20 in synergy value she should include in her console-only bid. Sequential auctions of single products, along with patient bidders with substitutes or complimentary valuations, produce both difficulties on eBay.[10] Furthermore issues such as no presence of automated notifications and no proper categorization as sorting also need to be addressed. Along with these there is problem for users where they cannot participate in overseas auctions and no proper currency conversions.

EachNet is a famous Chinese consumer to consumer online auction site and is alternative to E-Bay in China, fueled by the Chinese online auction industry's quick expansion and expanding demand. Based on auction processes of the platform, a basic framework has been built to aid in the investigation of numerous seller and buyer-specific factors impacting the final outcomes of online auctions, as well as the interdependencies between these elements Instead of judging the successes and failures of an online auction primarily on the final price, which might vary dramatically across product categories, three product-independent performance criteria were suggested: success-or-failure, efficacy, and satisfaction. The findings imply that the overall number of bids made by all competing bidders during the auction somewhat mediates the impact of seller characteristics and auction features defined by the seller on auction performance. The study's implications are also explored to encourage more research in this field.[14]

There have been several concerns with auction length and bid placements in recent online auction research. The duration of an online auction is set by the seller, and the pattern of bid arrivals is assumed to reflect bidders' bidding tactics and behavior. The most well-known occurrence in bid arrival process is late bidding, which provides a bidding strategy that many bidders often utilize frequently. Compared the duration distributions and bid arrival patterns of eBay auctions from numerous global websites at the same time, identifying a gap in the growing body of literature on online auctions in comparative studies of participants' behavior across similar but different platforms. The statistical findings suggest that this

comparison study is worthwhile. Finally, it is suggested that in future research, more complex data mining technologies may be required for analysis of online auction data.[12]

Bonsai is an example of a standard electronic auction system (www.bonsai.com). In Bonsai, new members must fill out a particular registration form. When a user joins the system, he or she can watch auctions, participate in auctions, and sell one or more things. Someone fills out a form with product details and the desired (minimum) price to sell something. Bids are collected for a defined period of time, following which the top offer and eventual winner are announced to bidders. An auction usually takes a long time to finish. Jerome J. Manning & Co.: Real Estate Auctions and Copart Salvage Auto Auctions are two similar systems. The emergence of eBay, however, has accelerated the growth of the real-time auction concept.[13].
From the literature survey its identified that there are lot of issues persisting with online auction systems with lack of cross platform support and uniformity being one of them.

III. PROBLEM DEFINITION

Some major Problems with current systems are as follows:

- Major platforms have an outdated UI/UX.
- Lack of synchronized User Interface across different platforms as user interface changes with change in platform.
- No system for bidding in native currency for an item listed in a different currency.

IV. OBJECTIVES

This solution has the following objectives:

- Create a sustainable cross platform auction system with optimized performance.
- Address notification and personalizing issues faced by users.
- Provide Uniform User Interface across all the platforms.

V. COMPARISON TABLE

Current Implementation	Proposed Model
• No Cross Platform Support or Optimization.	• Cross Platform Support and Optimization across all devices.
• Minimal Security System or Security approach.	• Implementation of Secure Sealed-Bid Auction System
• Minimal or No use of Cryptography as the central security system.	• Implementation of Cryptography as the backbone of security.
• No implementation of converting to native currencies and higher conversion rates.	• International Auction in native currencies at best conversion rates.

• Minimal Notifications and contacts with the user only using machine generated texts.	• Personalized notification and communication with the users.

VI. METHODOLOGY

The project will first start with the launch and auto login step, through which it will be verified that whether the user is already logged or not. If the function returns true user will be redirected to Homepage else Start page. Then options will be given for either login or signing up for account.

After the designated selection by the user, Homepage or the primary page will be loaded where the user can browse through the current and upcoming auctions which will be implemented by fetching data from back-end services and can list and auction as well.

After the desired action, auction page will be responsible for conduction of proper and smooth auction services. After the user selected their desired unit, they will be sent to the payment gateway which will be done using Razorpay. And at last backend services will be responsible for storing data and other assets for the website which will be done using Firebase and Rest API.

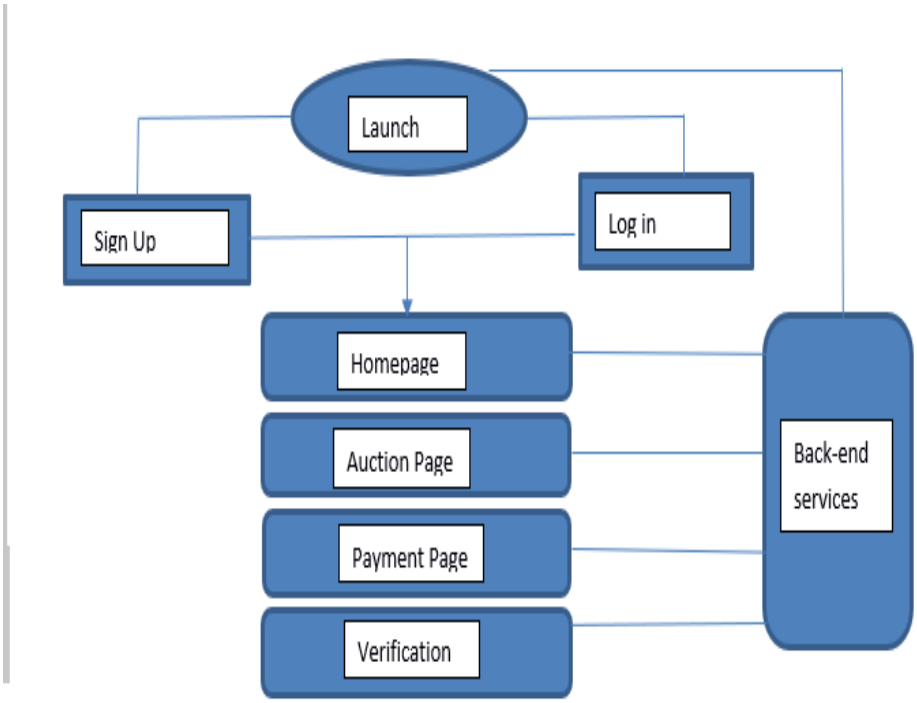


Fig 1: Flow Diagram

VII. MODULES IDENTIFIED

The modules can be hereby split into following:

- **Launch And Autologin**: On launch it will be verified that whether the user is already logged or not. If function returns true user will be redirected to Homepage else Start Page.
- **Sign Up Page**: This page will be helping the user to sign up on the platform by providing all the needed details.
- **Start Page**: This will contain options for signing up or logging in and functions will be executed as user wants

- **Home screen:** This is the primary page after logging in where user can browse through current and upcoming auctions which will be implemented by fetching data from backend services and can list an auction as well.
- **Auction Screen:** This is one of the main modules which will be responsible for conduction of proper and smooth auctions.
- **Payment Gateway:** A proper gateway for making payments for users need to be provided which will be done using Razorpay.
- **Backend:** Backend services will be responsible for storing user data and other assets for the websites which will be done using Firebase and REST API.
- **Authentication:** Authentication Services will be provided by Google Firebase API.

VIII. IMPLEMENTATION

As the project uses Flutter SDK all the code written will be in dart and will run across various platforms without much need for changing the codebase.

1) Launch and Autologin : Whenever the application is started the application makes a Firebase Authentication call to check if a user was already logged in into the applicatio, if the condition satisfies user data is fetched from Firestore Database and user is automatically logged in.

2) Sign Up Page: This page will consist of all the required fields a user needs to provide in order to register on the platform. Once a user signs up all there details are verified and stored on Firestore Database.

3) Start Page: This contains option to login and user can hereby provide credentials to sign in in case they have already registered. Whenever login button is pressed Firestore instance will make a call to database and locally store all details of user temporarily.

4) HomeScreen: This screen hereby contains two options with navigation bar at the bottom the user can navigate among different screens from the Bottom Navigation Bar. On the homescreen there are namely two main sections one is for creating a new listing and another which displays featured active listings. When a new listing is to be created a modal bottom sheet appears with various required parameters for the listing and when submitted details are verified and listing is created in the database using Firestore API. In same manner active listings are displayed on the home page for listings which are active.

5) AuctionScreen: This displays the selected active listing and the user can bid on the item from here. This fetches the current details of the listing from Firebase Firestore API.

6) Payment Page: The payment for this application is a wallet based payment system. Every user is assigned a virtual wallet where they can add money from almost every payment methods. This wallet money can later be used to make payments for various transactions and will be used to receive amount for sold items as well. User can hereby use it to withdraw money it a bank account. All these activities are being facilitated by use of Razorpay payment gateway API's.

7) Profile Page: On this screen user can hereby check all his personal details. Details here are being displayed by accessing the user data which is saved in the local memory on event of login or Autologin.

8) Listings Screen: This contains two options one for displaying listings added by user and other for listings users has selected as intrested in or has participated in. This is from where user can start the auctions from there lisitings. These are achieved by accessing the database and matching with the listings present in user profile details.

IX. CODE AND DATABASE STRUCTURE

The database structure is in a JSON (JavaScript Object Notation) format due to its easy usage and parsing capabilities.

The database for user data is as follows:

{
“Balance”: This indicates users current wallet balance,
“DOB”: This stores the users DOB.,
“Email”: Stores the name of item.,
“FirstName”: This fields contains first name of user.,
“Gender”: This field stores user Gender.,
“LastName”: This fields contains last name of user.,
“Mobile”: This fields contains contact number of user.,
“LastName”: This stores the URL of profile picture.

}

The database format for listing is as follows:

{
“About Item”: This contains details about item,
“Item Category”: This contains the category of the item.,
“Item Name”: Stores the name of item.,
“Item Price”: This fields contains current price of the listing.,
“isActive”: This field indicates whether the listing is live.,
“url”: This stores the url associated with the listing.
}

Based on the parameters mentioned a unique identifier is generated for each listing to top find it in the vast database.

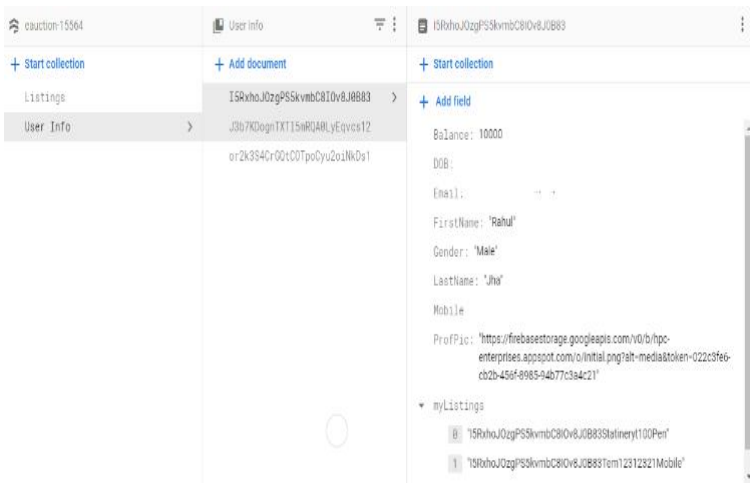


Fig 2: Database Structure for User Details

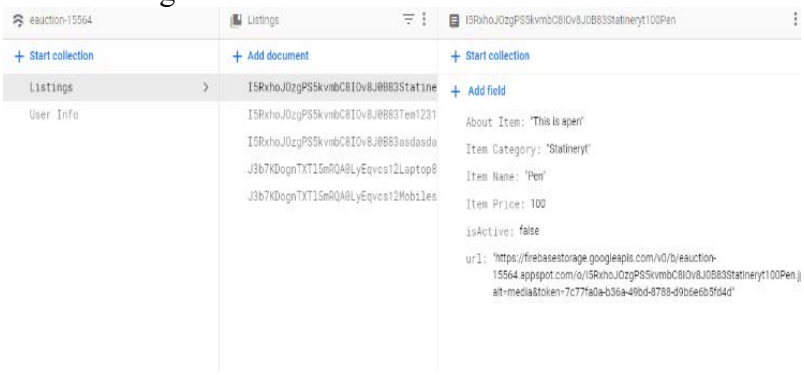
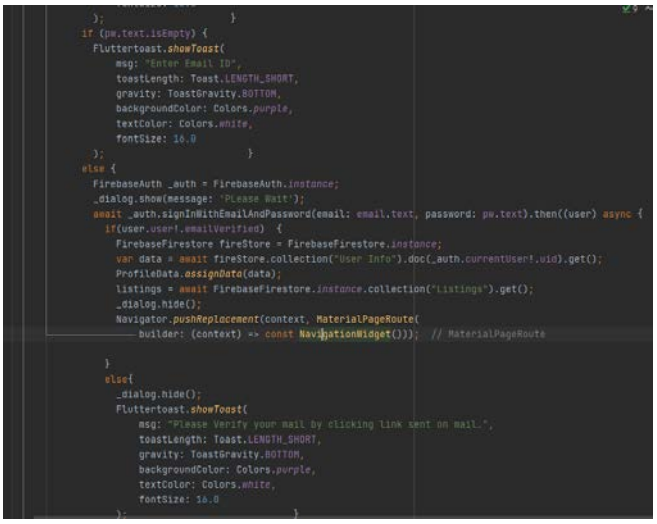


Fig 3: Database Structure for Listings

```
}

@override
void initState() {
  super.initState();
  _razorpay = Razorpay();
  _razorpay.on(Razorpay.EVENT_PAYMENT_SUCCESS, _handlePaymentSuccess);
  _razorpay.on(Razorpay.EVENT_PAYMENT_ERROR, _handlePaymentError);
  _razorpay.on(Razorpay.EVENT_EXTERNAL_WALLET, _handleExternalWallet);

}

@override
void dispose() {
  super.dispose();
  _razorpay.clear();
}

void openCheckout() async {
  var options = {
    'amount':widget.amount*100,
    // For testing purposes
    'name': 'EAuction ',
    'description': 'Add Money To Wallet',
    'prefill': {'contact': '', 'email': ''},
    'theme':{
      "color":"#800080",
    },
  };

  try {
    _razorpay.open(options);
  } catch (e) {
    debugPrint(e.toString());
```

Fig 4: Code Snippet For performing payments.



```
    );
  if (pw.text.isEmpty) {
    Fluttertoast.showToast(
        msg: "Enter Email ID",
        toastLength: Toast.LENGTH_SHORT,
        gravity: ToastGravity.BOTTOM,
        backgroundColor: Colors.purple,
        textColor: Colors.white,
        fontSize: 16.0
    );
  }
  else {
    FirebaseAuth _auth = FirebaseAuth.instance;
    _dialog.show(message: 'Please Wait');
    await _auth.signInWithEmailAndPassword(email: email.text, password: pw.text).then((user) async {
      if(user.user!.emailVerified)  {
        FirebaseFirestore fireStore = FirebaseFirestore.instance;
        var data = await fireStore.collection("User Info").doc(_auth.currentUser!.uid).get();
        ProfileData.assignData(data);
        listings = await FirebaseFirestore.instance.collection("Listings").get();
        _dialog.hide();
        Navigator.pushReplacement(context, MaterialPageRoute(
            builder: (context) => const NavigationWidget()));  // MaterialPageRoute

      }
      else{
        _dialog.hide();
        Fluttertoast.showToast(
            msg: "Please Verify your mail by clicking link sent on mail.",
            toastLength: Toast.LENGTH_SHORT,
            gravity: ToastGravity.BOTTOM,
            backgroundColor: Colors.purple,
            textColor: Colors.white,
            fontSize: 16.0
        );
```

Fig 5: Code Snippet for logging in and running queries to save user data

```
void initState() {
  fetchData();
  // TODO: implement initState
  super.initState();
}
List myListings = [];
bool isLoaded = true;
Map dict = {};
fetchData() async{
  for(int i=0;i<ProfileData.userData['myListings'].length;i++){
    var data = await listings.doc(ProfileData.userData['myListings'][i]).get();
    dict[data['Item Name']]=ProfileData.userData['myListings'][i];
    myListings.add(data);
  }
  setState(() {
    isLoaded = false;
  });
}
```

Fig 6: Code snippet for running queries to find user listings to display

X. Conclusion

It can be hereby concluded that using Flutter SDK an optimized auction system can be implemented which can address a lot of issues and challenges with current major platforms. Furthermore, challenges such as inconsistency across various Operating Systems are also fixed and various algorithms for efficient auctions will be implemented.

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Real-Time Detection of Poaching in Wildlife Reserves with Thermal Imaging and CNN Using IoT and ML

Aishwarya Girish Menon
A. Abhishek
Arbaaz Ahmed
Anusha S.N
Kiran M
School of Computer Science and Engineering, REVA University

***Abstract*—**With the advent of European colonization,Poaching and wildlife smuggling has been a vital issue since the 17th century. Illegal hunting of animals threatens the very existence of these organisms and results in the imbalance of the ecosystem and biodiversity of our planet. The objective of the proposed system is to detect poachers using the technologies, Internet of Things (IoT), Unmanned Aerial Vehicles (UAVs), Dashboard cameras, trail cameras and Machine Learning. Detection of poachers is performed using Infrared Cameras that can switch between normal imaging during the day and thermal imaging during the night. This approach reduces a lot of manual labor and improves the precision of detection of poachers with real-time analysis and alerting. Internet of Things is used for data collection and transmission while Convolutional Neural Networks (CNN) trained using TensorFlow, OpenCV and Python aids in the data analysis for classification. An IoT-based system is used for the automated surveillance task and to perform real-time detection on collected live feed. Classification of the live video feed also allows us to keep track of the number of each wildlife species, the number of people and vehicles present in reserve. An Artificial Neural Networks (ANN) model trained with Keras, is used for the detection of gunshots in the wildlife reserves as well. The proposed system is self-maintainable and doesn't require human interaction as it functions on solar energy and uses automated GPS system to traverse through the Wildlife reserves and track real-time location.

***Keywords*—Machine Learning, Convolutional Neural Networks, Thermal Imaging, Internet of Things, Artificial Neural Networks, Gunshot Detection, Poaching Detection**

1. INTRODUCTION

Poaching has been prevailing as a major concern in our society since the advent of European colonization. The need for food, traditionalmedicines and materials, selling of animal parts like Elephant tusks, Tiger fur, Rhino horns as materials or trophies for display, and the recreational hunting of various organisms have tremendously affected the population and survival rate of several animal species. Despite placing strict governmental rules on poaching, humans continue to hunt animals for wildlife smuggling. To protect animals in wildlife reserves from poachers, forest rangers manually conduct patrols on feet or by vehicles throughout the forest reserve. However, it is impossible for the forest rangers to manually traverse and track down poachers at every region quickly with limited manpower.

In some existing projects, the live video feed from a UAV surveillance system is sent to the forest rangers, who then have to manually search for poachers that results in a tedious and erroneous task to monitor the video feeds all day and night.

Moreover, trekking through the forests with wild animals at night, pose threats to the lives of the forest rangers. Recent research and techniques to resolve this issue has been focused on machine learning concepts like computer vision, object detection and on thermal imaging. There is a need for a system that runs real-time detection on the live video and audio feed from the surveillance system that either traverses through the wildlife reserves or tracks every region of the reserve at all times at every region of the reserve to survey for poachers. The system alerts the forest rangers if any anomaly is detected.

Internet of Things refer to network of interconnected devices that exchange information, control, and interact with the surroundings and every other device within that network without human interaction. ArtificialNeural Networks are computational system units or artificial replicas of the biological brain function that consist of processing nodes to apply activation functions on inputs and provide outputs in the same way the brain neurons of a biological brain process

information.Convolutional Neural Networks are ANNs that perform image recognition and processing tasks based on the patterns derived from pixel data of images. Thermal imaging refers to the depiction of infrared radiations reflected off objects in the form of an image in the visible light spectrum.

In this paper, Internet of Things is used for data collection and surveillance, while CNN models classify poachers, forest rangers and different animal species from the live video feed and ANN models classify gunshot or other noise data from the live audio feed. If any anomaly is detected in the detection tasks, the forest rangers are immediately alerted via an SMS-based system.

2. LITERATURE SURVEY

In paper [1], the authors proposed a Mavic Pro 2 Drone system that transmits 4K videos at 30 fps over a distance of 7 km. The video streams from the drone are redirected through a controller via a Wi-Fi connection to a field laptop or remote server using 4G technology. A real-time messaging protocol is used to transmit the video feed to an online server withthe object detection model having a Faster-RCNN network.

In paper [2], the authors proposed a Drone system with a Global Navigation Satellite System (GNSS) for navigation and precise geographic coordinate positioning. The system was used for the detection of Elk species in Siberia. Data was collected using a Wide Area Sony RX1R camera and a Thermal Imaging camera Atom500 and processed manually with a Thermal Image object finder software.

In paper [3], the authors developed a Smart thermal infrared camera UAV system called SPOT. The system used a Faster RCNN network for object detection and Azure Cloud GPU for more processing speed and power. The UAV flight path was manually controlled and a FLIR 640 Vue thermal imaging camera was used for data collection.The object detection model used a Faster RCNN Network for detection and classification.

In paper [4], the authors proposed a Support vector machine-based object detection model. The insights from the analyzed data were sent via SMS to the respective person. The accuracy of the project was quite low using SVM.

In paper [5], the authors created Infrared Radiation Dataset with Aerial images of wildlife reserves with animals and poachers using the FLIR Vue Pro 640 camera with Tamarisk 640 for public use. The captured dataset was labelled using a tool called VIOLA and multiple object detection network models such as YOLO, Faster RCNN and Domain Adaptive Faster RCNN were tested on the dataset to find the most efficient network model.

In paper [11], the authors proposed an end-to-end, distributed, IoT based monitoring system for wildlife reserves based on edge cloud systems. Image classification and tagging were performed using TensorFlow and OpenCV. A synthetic training dataset was created using google stock images. The system was used to identify bears, deer, and coyotes. The IoT system acts as a set of eleven camera traps to collect images around different regions of the wildlife reserve. The collected data was transferred to the edge cloud computing system for storage and processing using Wi-Fi technology.

The disadvantages found in the papers above include the manual control of the UAV system for monitoring the reserve with controllers, use of inaccurate object detection and classification methods as seen in paper [4], lack of real-time alerting with the precise location of animals, poachers or rangers and manual input of data collected from the UAV to an object detection model for classification. In paper [5] data collected is used only for night-time monitoring as infrared waves cannot provide accurate results during the daytime.

3. PROPOSED SOLUTION

The proposed system uses IoT for Data collection and transmission, while CNN and ANN models using ML and Deep Learning aid in data analysis and classification. Raspberry Pi module was chosen as the microcontroller as it is equipped with a fast-processing speed, integrated Wi-Fi chip, stable network connectivity and quick response to program instructions in real-time.

A. Software Terminologies

Convolutional Neural Networks (VideoClassification):

CNN models are a subset of machine learning technology used for analyzing, detecting patterns, and classifying image

and video datasets. It consists of 3 main layers. The first layer, convolution or maxpooling layer is used to find the features present at a given region of the feature maps generated to reduce the number of parameters to be learned. In the second layer, fully connected dense layers are used to feed the collected information about the image and its features to each of the neurons in the network and vector operations are performed. The final layer, the output layer is used to obtain the classification details of the given image based on its features upon applying activation functions to the input from the dense layer. Fig.1 represents the working of CNN models.

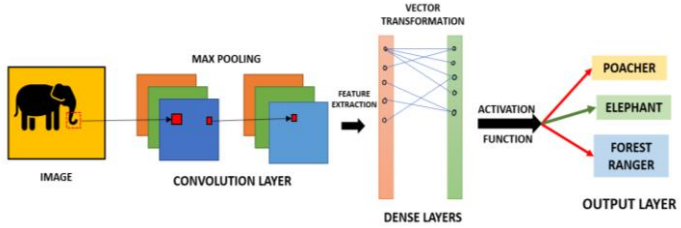

Fig.1. Working of the CNN models.

Artificial Neural Networks (Audio Classification):

Artificial neural networks are a collection of nodes that process the feature inputs fed to them by applying an activation function over them to obtain the final output. It consists of 3 layers, the input layer at which the input audio is fed to the nodes, the hidden layers that process the audio, extract features from its waveform and classify the feature inputs and the output layer at which an activation function is applied to the feature inputs from hidden layers before releasing the final output, that classifies what the audio sound represents. Fig.2 represents the simplified working of the audio classification ANN model.

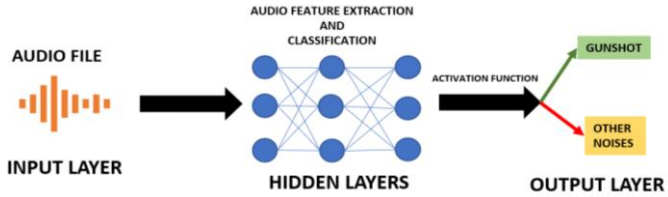

Fig.2. Working of the ANN models.

Internet of Things (Surveillance System):

Internet of Things refer to a network of electronic devices, software, embedded systems, and sensors interconnected between one another for the exchange of data. The interconnection between the trail cameras, drone systems and vehicle dashboard cameras to the central computing system for data exchange is an IoT network.

B. Surveillance System Construction

The collection of data is performed by the autonomous drone systems, trail cameras and vehicle dashboard cameras. These systems are controlled using a Raspberry Pi B+ module acting as the microcontroller or the brain of the system. The drone system chassis is constructed based on a quadcopter design with 4 brushless DC motors and propellors to propel the system into the air. It uses a flight controller for all flight control functionalities and an electronic speed controller to adjust the motor speed.A gyroscope is used to adjust the quad's orientation, acceleration, and velocity.The drone will be powered with a Li-On battery which may be chargedusing Solar panels coupled with Li-On charging modules. A GPS modulewill be used to guide the drone throughout different geolocations in the wildlife reserve, where each pair of geographical coordinates will be pre-programmed on the microcontroller. A magnetometer will help the drone to adjust and identify its current orientation and direction. In order to assist in the detection of Gunshots in the forest reserve, a USB microphone is attached to the USB port of the microcontroller. The collection of thermal or normal video feed of the wildlife reserve in real-time is performed using an Infrared camera unit attached to the drone. The camera activates thermal vision during the night and normal vision during the day.A light intensity sensoris used to detect the intensity of light throughout the day and adjust the camera vision. If the light intensity is low, the thermal imaging vision is activated and when the light intensity is high, the normal imaging vision is activated.The USB

microphone present on the drone system transmits live noise feedback from the area where it is patrolling to the central computer. Fig.3 depicts the block diagram of the Drone system construction.

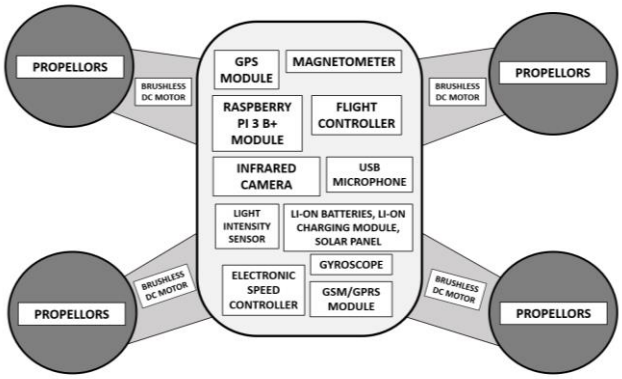

Fig.3. Block diagram of Autonomous GPS Drone system.

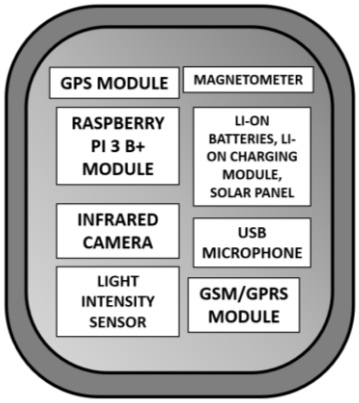

Fig.4. Block diagram of Dashboard and Trail Camera system.

Fig.4 represents the chassis and the components of a trail camera and dashboard camera system. The system consists of a Raspberry Pi B+ module functioning as the microcontroller, a magnetometer to track the system's direction, an infrared camera to stream live video, a USB microphone to record surrounding area noises, a light intensity sensor to detect whether it is day or night, a GSM/GPRS module to send alerts immediately if poachers or gunshots are detected and solar panels with Li-On charging modules and batteries to power the system.

C. Object and Acoustic Noise Detection Systems

The real-time video feed is analyzed and classified using twoCNN object detection models, one for daytime analysis and the other for night-time analysis. The models are pre-trained on a large dataset containing images of poachers, forest rangers and animals in thermal vision and normal vision. The Raspberry Pi B+ module is connected to the laptop using Wireless Connection through a common Wi-Fi network and streamed on-screen using VNC viewer software. Putty.exe is used to establish an SSH connection with the module for network configuration. The training of the CNN and ANN models were performed on Jupyter Notebook, an open-source software integrated development environment (IDE). All collected data such as video feeds, audio feeds, generated alerts and other counting and detection information are stored in the central computing system.

The datasets having normal images and thermal images are first acquired using python and OpenCV scripts. The dataset is then labelled using a tool called *LabelImg*. The labelled images are segregated into train and test folders on a 70:30 ratio. The required file paths are set, and a label map is generated along with TF records. The TensorFlow object detection library is cloned, and a preconfigured model called SSD mobile net v2 is reconfigured and updated to function according to the proposed system. The two CNN models are finally trained, wherein one model trains and tests on the Normal vision dataset for daytime classification and the other model trains and tests on the Thermal vision dataset for

night-time classification. The trained models are loaded and run to detect poachers, forest rangers and different animal species in real-time.The activation function used by the CNN model is ReLU6which is a modified version of the rectified linear unit where the activation is limited to a maximum size of 6. An open-source autopilot Map-based system software called ArduPilot is used to pre-program the flight path with its geographic coordinates to the flight controller and microcontroller of the Drone system. The proposed system further verifies whether the object detected by the system as a poacher, or a forest ranger is accurate. This is done by the proposed system by sending the GPS coordinates of the location where the forest ranger or poacher was identified to the central system. The central computer uses python scripts with python libraries like Open Cage Geocoder and Folium to confirm the location of forest rangers in the wildlife reserve by comparing the coordinates from the surveillance system to each of the forest ranger's coordinates. The location of every forest ranger is continuouslytracked by using the IP addresses of their Mobile devices. If the coordinates do not match the coordinates of the forest rangers, then the identified human may be confirmed as a poacher.An acoustic noise detection model created with ANN is used for the detection of gunshots in the wildlife reserves. The USB microphone present on the proposed system transmits live noise feedback from the area where it is patrolling, to the central computer. The central computer converts the received noise data to a wav file using python scripts and feeds the wav file to an ANN model that was trained using Gunshot and other noise waves to classify the detected noise using Keras.Mel-frequency Cepstrum (MFCC) was used for feature extraction during data preprocessing. A python package called Librosa is used to perform audio analysis on the audio datasets. Keras is an open-source software library that aids in the creation of ANN models. The model used ReLU and SoftMax activation functions with Adam optimizers. SoftMax is a function that turns a vector with *k* real values into a vector with *k* real values having a total sum of 1. ReLU is a linear function that outputs input directly if it's positive else it outputs zero.

D. Working of the proposed system

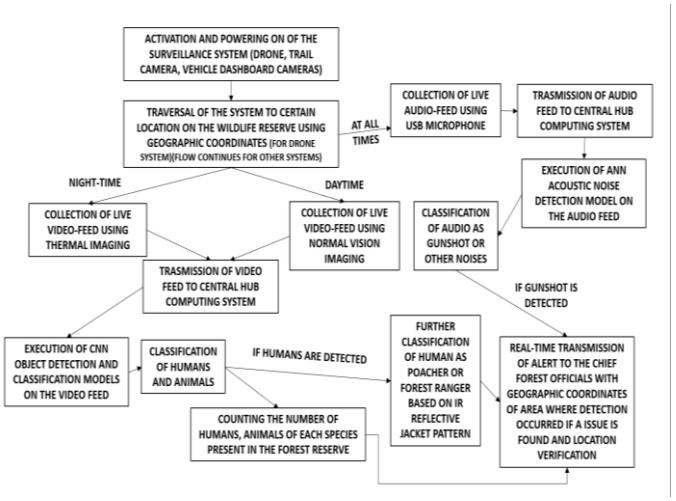

Fig.5. Flow diagram of processes of the proposed system.

Fig.5 represents the complete process of the proposed system as a flow diagram. The system begins operation upon activation and powering it on. For drone systems, the drone traverses to a certain location on the wildlife reserve using the pre-programmed geographic coordinates on the flight controller. The system (drone, dashboard camera or trail camera) collects normal vision live videofeeds during the day and thermal vision live videofeeds during the night. The USB microphone simultaneously collects the live audiofeed. The collected live audio and videofeeds are sent to the central computing system.

CNN models are run over the live-video feeds to detect humans and animals. It also returns the count of the number of humans and the number of animals of different species via SMS to the chief forest rangers. If humans are detected by the CNN model, it further classifies the human as a poacher, ora forest ranger based on a unique pattern reflected by the IR reflective jackets worn by forest rangers on the live videofeeds. At the same time, the ANN model is executed on the live audiofeed for the detection of gunshots. If the CNN and ANN models detect poachers or gunshots at a particular location, it performs the real-time transmission of alerts to the chief forest officials with the geographic coordinates of the location where the anomaly was detected via an SMS system using the GSM/GPRS module. Further verification of the location of poachers and forest rangers is performed by verifying the cellular IP address location coordinates of the forest rangers to ensure that the detected human being is a poacher or not. If the coordinatesdo not match with the

coordinates of any of the forest rangers, the detected human is verified as a poacher.

4.Experimental Results

For the purpose of demonstration on how the surveillance system would stream the video data to the central computing system and the how object detection models are run on the live feed, a Raspberry Pi 3 B+ module with NOIR IR camera has been used. The CNN and ANN models are run inside the Raspberry Pi module, on the real-time data collected by the NOIR camera. Fig.6 below is an image of the microcontroller and camera.

Fig.6. Raspberry Pi 3 B+ and NOIR IR camera.

During daytime, the surveillance system collects live video feed using normal vision and transmits the video to the central computer system. A CNN model is then run on the live video feed to classify any object it detects as Forest ranger, poacher or any animal species. The objects classified as humans initially and they are further classified as Forest rangers if the model detects any special patterns reflected by the reflective jackets worn by them, on the live feed. The other objects classified as humans are further classified as Poachers, if it doesn't detect any unique reflective patterns on the human. The model was trained using a dataset having 1036 images consisting of poachers, forest officials and elephants as the animal species in the forest reserve. The images of poachers and rangers used for training are custom collected dataset while the images of elephants used for training are google images. The labels used for labelling and classifying the images were poacher, forest ranger and elephant. The model was trained for 10,000 epochs and the average loss score was 0.171. The average accuracy was 86-98%. The daytime dataset was split at a percentage of 70% for training and 30% for testing.

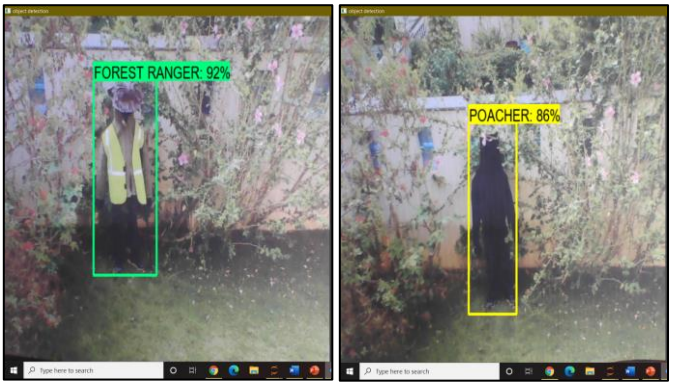

Fig.7. Detection and Classification of forest rangerand poacher usingDaytime CNN model.

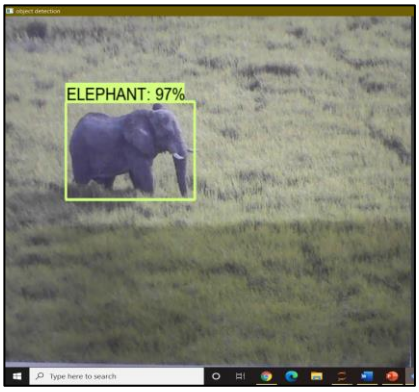

Fig.8. Detection and Classification of Elephants using Daytime CNN model.

Fig.7 and Fig.8 depict the real-time detection and classification of poachers, forest rangers and elephants when the CNN model is run on the live normal vision video-feed from the surveillance system.During Night-time, the surveillance system collects live video feed using thermal vision and transmits the video to the central computer system. A CNN model is run on the live video feed to classify any object it detects as forest ranger, poacher, or any animal species.The objects classified as humans initially and they are further classified as Forest rangers if the model detects any special patterns reflected by the reflective jackets worn by them, on the live feed.The other objects classified as humans are further classified as Poachers, if it doesn't detect any unique reflective patterns on the human as done in daytime model. The model was trained using a dataset having 400 images consisting of poachers, forest officials and elephants as the animal species in the forest reserve. The dataset of poachers, rangers and elephants used for training were obtained from BIRDSAI[7] dataset and google images. The labels used for labelling and classifying the images were poacher, forest ranger and elephant. The model was trained for 10,000 epochs and the average loss score was 0.233. The average accuracy was 90-100%. The night-time dataset was split at a percentage of 70% for training and 30% for testing.Fig.9 and Fig.10 depict the real-time detection and classification of poachers, forest rangers and elephants when the CNN model is run on the live thermal vision video-feed from the surveillance system.

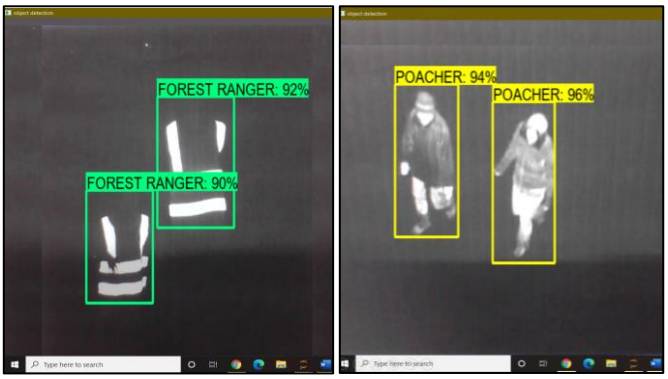

Fig.9. Detection and Classification of forest rangers and poachers usingNight-time CNN model.

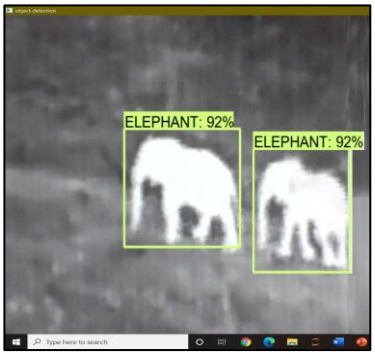

Fig.10. Detection and Classification of Elephants using Night-timeCNN model.

The USB microphone present on the drone system transmits live noise feedback from the area where it is patrolling to the central computer. The central computer converts the received noise data to a wav file using python scripts and feeds the wav file to an ANN model that was trained using Gunshot and other noise waves to classify the detected noise using Keras. The ANN model was trained for 250 epochs and acquired an average accuracy of 80%. The dataset was split at a percentage of 80% for training and 20% for testing. Fig.11 represents the output obtained upon classifying an audiofeed detected as gunshot noise with the label *gun_shot*. The graph plotted using matplotlib depicts the waveform of the detected audio as a time series graph for visualization.

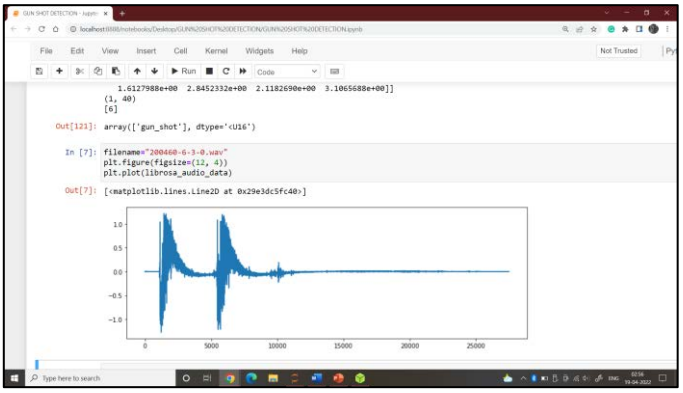

Fig.11. Detection of Gunshots from recorded live audiofeed.

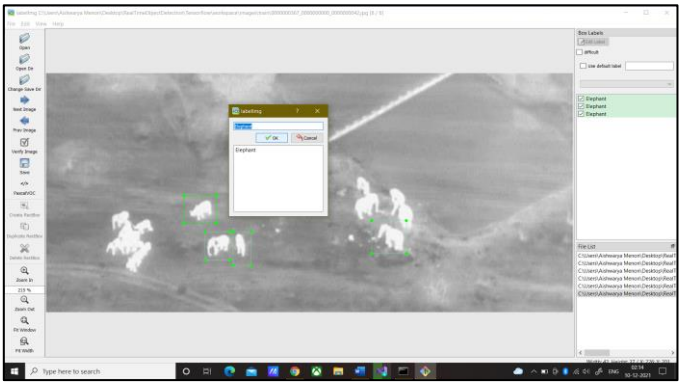

Fig.12. Labelling of dataset images using *LabelImg* tool.

Fig.12 represents the labelling process of the collected dataset using *LabelImg* tool.

5. CONCLUSION

Poaching has been a prevailing issue in the modern society that affects the biodiversity, ecosystem and the very existence of the flora and fauna of our planet. Thermal imaging and Machine learning have emerged as novel technology capable of resolving poaching. In this paper, the proposed system combines two disciplines of computing: the Internet of Things and Machine Learning. Real-time video streams from the surveillance system are evaluated and classified using a convolutional neural network model. An ANN model is further used for the detection of gunshots in the wildlife reserves. Real-time alerts are transmitted to the chief forest rangers or officials upon the detection of poachers or gunshots in wildlife reserve.The proposed system will provide aid to the Governmental, Commercial and NGO organizations for the protection, preservation, and conservation of endangered animals in the wildlife reserves.The estimated cost of the system is cost-effective compared to commercial systems in the present-day markets. Multiple models of the proposed systems may be deployed using the proposed plan at the cost of one high-end system currently available in the market.The proposed system will also reduce the dangers faced by forest rangers during the night patrols in wildlife reserves with predatory animal species by reducing the manpower required for monitoring each region of the reserve manually.

6. FUTURE WORK

In this paper, the Convolutional Neural Networks model for detecting Poachers in wildlife reserves and an Artificial Neural Networks model for detecting gunshots were developed and tested on a small-scale surveillance system. In future, a fully functional IoT-based autonomous GPS enabled surveillance system (using Drones, Trail cameras, Vehicle dashboard cameras) with the ML models [6], [8], [9], [10], [12] may be implemented for commercial and public use. The technology of using laser ID reflectors to uniquely identify forest rangers may also be implemented in future.

7. ACKNOWLEDGEMENT

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Transcend Health: Healthcare Solution Using Machine Learning Approaches

Nilesh
School of Computer Science and Engineering
REVA University
Bengaluru, India
nilesh1722000@gmail.com

Prajwal U
School of Computer Science and Engineering
REVA University
Bengaluru, India
prajwal.u.34@gmail.com

Nikhil Gangneja
School of Computer Science and Engineering
REVA University
Bengaluru, India
nikhilgangneja@gmail.com

Neelakanth S
School of Computer Science and Engineering
REVA University
Bengaluru, India
neelakanth2000@gmail.com

Prof. Ranjitha U N
School of Computer Science and Engineering
REVA University
Bengaluru, India
ranjitha.un@reva.edu.in

***Abstract*—The health-care industry generates a lot of information. It's simple to tap into this data and predict diseases early, thanks to technological advancements. Chronic disorders such as coronary artery disease, chronic kidney disease, and diabetes have a high mortality rate and can be fatal if not diagnosed and treated early. In order for people to be able to heal themselves of these ailments, this machine learning prediction must be made publicly available to everyone. Our proposal is to create a one-stop health-care solution in this regard. People can utilize the web application to submit symptoms and other information related to the disease, and the machine learning model will predict the presence of a disease and display it to the user. Medical data is collected and these statistics are used as input for the models, and those abilities are then modeled for prediction of the diseases to provide high accuracy. This model is then used at the backend to forecast future medical conditions of people. This solves the issue of getting tested for disease without requiring considerable bodily action, traveling to the hospital, which in turn minimizes the number of tests to be conducted. This drastically reduces deceiving people to take many tests and lowering the costs.**

Keywords—Machine learning, chronic kidney disease, coronary artery disease, diabetes, web application, foolproof healthcare

I. INTRODUCTION

Healthcare is one of the most in-demand fields in this new post-covid era, where everything is geared toward the internet and virtual worlds. Much of the real-world problems may be handled with the aid of artificial intelligence and data mining tools. Data mining, which combines several disciplines, is employed to draw out valuable information from huge quantities of data. It's beneficial for extracting healthcare information for clinical decision-making and generating hypotheses from large quantities of medical data. The health-care business generates enormous amounts of data, and by analysing this data, many illness may be recognised and predicted early on, and even be treated early to prevent mortality. Simultaneously, rapid advancements are being made in clinical analytics, such as systems for evaluating and analyzing massive amounts of data and drawing new insights continuously from these analyses. This brings up incredible prospects to save health-care expenses while also making illness diagnosis considerably easier.

Chronic renal disease is a serious and major problem across the world, and it is a condition marked by a gradual decrease of kidney's performance over time. It affects around one-sixth of the world's population. The symptom of This disease is that it will not cleanse the blood as well as it should, leading to renal failure. The proliferation of Plaque is the most common cause of coronary artery disease. Coronary arteries constrict leading to a condition which reduces the blood flow to the heart. This disease can occur and may exhibit in a variety of ways, the symptoms can range from no symptoms to chest discomfort and ultimately

to a heart attack as well. Diabetes occurs when blood sugar levels remain high for an extended length of time. It has recently been identified as a risk factor for many diseases such as blindness and renal failure.

A web application is developed to allow anyone to predict if they are healthy or not using machine learning models and determine whether or not they have the condition. Because of the accessibility of access to the internet, web apps are frequently utilized. The major goal of establishing a one-stop health-care system is to provide a fool-proof health solution. People are frequently duped into undergoing many needless tests, resulting in higher hospital expenses. Doctors' workload is also increased as a result of this. The amount of time we spend interacting with the hospital is decreased when we use this app, as is the time we spend waiting for testing. In recent years, the hospital atmosphere has been viewed as unsafe. However, with the online web application, anybody from anywhere in the globe may utilize the services given to check for infections which saves time instead of waiting for the doctor's appointment.

For each disease, we applied various machine learning models in our study. Classification algorithms are used in the models which is a common technique that is utilised in a variety of applications, including locating unknown samples. Diseases are diagnosed using a combination of clinical indicators and laboratory results. To mention a few, the models include decision tree classifier, extra boost classifier, support vector machine, logistic regression, random forest classifier, and k nearest-neighbour. All of the models were evaluated, and the best algorithm was chosen and incorporated with the online application to accurately forecast the disease's outcome. The data was first processed to make it usable for the models, while also cleaning and refining it to improve accuracy.

II. Related Work

A. Chronic Kidney Disease

Ebrahime Mohammed Senan[1] and teams suggested that in the data pre-processing stage the mean statistical is used to replace missing numerical values whereas mode statistical analysis method weas used to replace the missing categorical values. And then the feature selection was done, to do this the features were removed recursively using RFE algorithm to end up with the most important features in the set for the modelling purpose. Four popular machine learning algorithms were used namely SVM, KNN, decision tree, and random forest for modelling to extract the best diagnostic results. The random forest classifier gave the best accuracy of one hundred percent, and classified all the positive and negative samples accurately.

Imesh Udara Ekanayake[2], in his research concentrated on data cleaning. Where the with attributes with more than one fifth of data had missing values were deleted as it did not contribute much for prediction. As a result, the features such as blood cells count etc. are left out of the analysis. In the next step the missing values in the other features were handled. To ensure satisfactory accuracy, missing values must be handled in the pre-processing step depending on their distributions. Little's MCAR test was used in this study to confirm the randomization of missing values. The missing values were substituted by taking average value using the KNN model instead of just substituting it with the mean or mode statistics. When this was compared to data which had been substituted with the mean and mode values, the results showed that the KNN infused dataset gave better accuracy for the models in prediction of the disease. This increases the scope to investigate and invest in KNN imputer based techniques to handle missing values in the sets of data which in turn will increase the accuracy of prediction. Additionally, by taking into consideration factors such as water intake patterns, and dietary kinds into the research, more information about CKD can be learned.

Chronic kidney disease was studied and evaluated by S.Revathy[3]. Chronic Kidney Disease(CKD) is a disorder wherein the kidneys are unable to fulfil their normal blood filtration and other functions. Kidneys' main function is to filter-out excess water and waste from the blood. processing. Pre-processing data acquired from numerous sources makes it easier to use data mining methods. On the CKD datasets, this paper depicts how to develop and use a data mining technique for extracting useful information. A large number of CKD datasets are gathered. The usual data mining approaches of data preparation and pre-processing are used. To predict the early onset of CKD using data mining, three machine learning methods were used namely support vector machine, Decision tree classifier and Random Forest classifiers. Each algorithm's effectiveness is evaluated using various parameters, and the model which had the highest effectiveness was selected.

B. Coronary Artery Disease

Rahul Gupta[4] and his team worked on diabetes detection. Humans are at risk from diseases such as coronary artery disease, cancer, and tumour illness. The recommended study in this paper was conducted in this regard to forecast coronary disease early on. AI techniques are frequently used to detect heart disease. Medical data is collected and these statistics are used as input for the prediction of illness. These techniques can then be used to predict medical condition in the future. In the suggested approach, they apply three alternative data mining strategies. The model's accuracy while employing each of the methods is intended. The algorithm with the highest accuracy is then chosen for predicting the diseases. The proposed approach uses machine learning to detect and predict the likelihood of developing coronary artery disease. For predicting the CAD various machine learning techniques were used such as SVM, random forest and Naïve bayes classifier. The data for this analysis was gathered from the uci data repository, and it also contains data collected from other sources. The training dataset comprises the prediction of heart disease incidence for various age groups.

Santosh kumar[5] and team utilised a publicly available dataset, machine learning systems can detect the existence of heart disease with excellent accuracy. This paper showed that when it comes to detecting CAD, the neural network model beats other machine learning methods. Many machine learning techniques were developed and applied to the data after the dataset was pre-processed. Evaluation metric such as F1 score and accuracy used to evaluate the models results. The six machine learning models performed admirably, with accuracies of better than 80 percent. Tools such as R was used in this research and investigation, this has also been. Using a publicly available dataset, machine learning methods may be used to detect the presence of heart disease with high F1 score and accuracy. Here they also showed that the random forest classifier was prone to overfitting compared to the other models. Hence the neural networks models was used to predict the disease accurately.

The goal of Rashmi[6] and her team's research is to use machine learning to diagnose cardiac disease using a minimum number of attributes. They also used Hadoop and big data analytics concepts to run the models and provide faster outputs. This random forest classifiers were running on different nodes on Apache Spark to provide a solution in a more accurate and faster manner. This method provides health care analysts a huge potential to use these techniques to tackle the hurdle of analysing huge amounts of data. The focus of this project is on the data analysis portion. The healthcare data collected every now and then in the Medicare industry may be handled quickly using big data analytics for illness prediction with minimal overhead. They suggested and evaluated a scalable approach for predicting heart disease characteristics. They used the Spark framework to develop the random forest method for predicting heart

illness, and they demonstrated that it can operate with as few as six hundred data records and were able to achieve ninety eight percent accuracy.

C. Diabetes

Aishwarya Mujumdara[11] suggested that in order to provide more accurate and exact findings, the model deals with inconsistencies in data. There were missing values in the dataset. Because these attributes cannot have 0 values, these values were substituted with other values and was handled appropriately for a few selected attributes. The dataset was then scaled to normalize all values to achieve better results. Then multiple machine learning classification techniques were applied to the preprocessed data, and this classification results were evaluated. Different models which were used are Logistic Regression, AdaBoost classifier, Extra trees classifier etc. Among these algorithms the model with the best accuracy was chosen which turned out to be the AdaBoost classifier with an accuracy of 98.8%. They had seen a comparison of the accuracies of two distinct machine learning algorithms using two separate datasets. They used numerous evaluation criteria, such as classification accuracy, confusion matrix, and f1-score, to assess the prediction outcomes.

Mitushi Soni[12] suggested several measures that were made in this project. Different categorization and ensemble approaches are used in the suggested strategy. In this study, it was discovered that random forest classifiers outperformed the remaining classifiers in terms of accuracy. All in all, they applied the few of the most advanced data mining techniques for detection and prediction of the diseases with excellent efficiency and accuracy. In this case, characteristics played a significant impact in prediction. The main intention behind this research was to develop a diabetes prediction model using data mining techniques. This research also evaluates and analyze the performance of all the developed models and ultimately select the best model with the best accuracy. The different models used ranges from random forest classifiers to logistic regressions to SVM. Gradient Boosting classifiers were also used in this research paper, as well as other classification and ensemble learning approaches. Furthermore, a classification accuracy of 77% was achieved using Random Forest. The outcomes of the experiment can help people to diagnose diabetes at an early stage in order to cure and save lives.

Ayush Anand[13] used data acquired manually through questionnaires in this study. The questionnaire was created solely through discussions with doctors, two of whom were Diabetologists. For a highly categorized dataset, the CART(Classification And Regression Trees) prediction model was used which resulted in 75% accuracy. The k-fold cross-validation approach was used to validate the results, which was followed by the CART technique. The complete data set was divided into five portions, with each fold serving as a test set once and a training set for the remaining iterations. As a result, they were able to improve the accuracy of the created model while still providing completely unbiased data. Many key attributes were discovered in this research. These key attributes are daily lifestyle activities which can influence and cause diabetes to occur. These attributes are eating at roadside eateries, fluctuation of blood pressure, irregular sleep cycle, high intake of rice and also inheritance of diabetes from parents. As a result, while one should appreciate every part of one's life, a little prudence in one's everyday routine is not harmful.

III. METHODOLOGY

A number of different data mining techniques were experimented to analyse the datasets. For each disease a dataset was collected and used for the analysis. We utilized machine learning techniques such as KNN, random forest, decision tree and SVM. In pre-processing, handling of missing values is done.

Various strategies were used to pick important features. Disease diagnosis was based on a few selected characteristics. Three diseases were identified in this study: Chronic kidney disease, Coronary heart disease, and Diabetes. KNN, random forest, decision tree and SVM and boosting approaches were utilised as algorithms. All of the classifiers produced promising and exceptional results for predicting and diagnosing the given variable into diseased or not.

A. Dataset

There were 400 entries and 25 characteristics in the kidney disease dataset. Attributes such as Age, haemoglobin, appetite, blood pressure, diabetes, sugar, red blood cells, and other characteristics are included. CKD and not CKD are the two values in the diagnostic class. Except for the diagnostic feature, all features had missing entries.

There are 768 entries in the Diabetes dataset, and it has 9 characteristics. Age, blood pressure, pregnancy, hyperglycaemia, and other factors are all considered. There are two values in the diagnostic class: 0 and 1. There were some missing values in some features.

There were 303 entries and 14 characteristics in the Heart disease dataset. Age, kind of chest discomfort, resting blood pressure, sex and other characteristics are included. There are two values in the diagnostic class: 0 and 1. There were no missing values in any of the features.

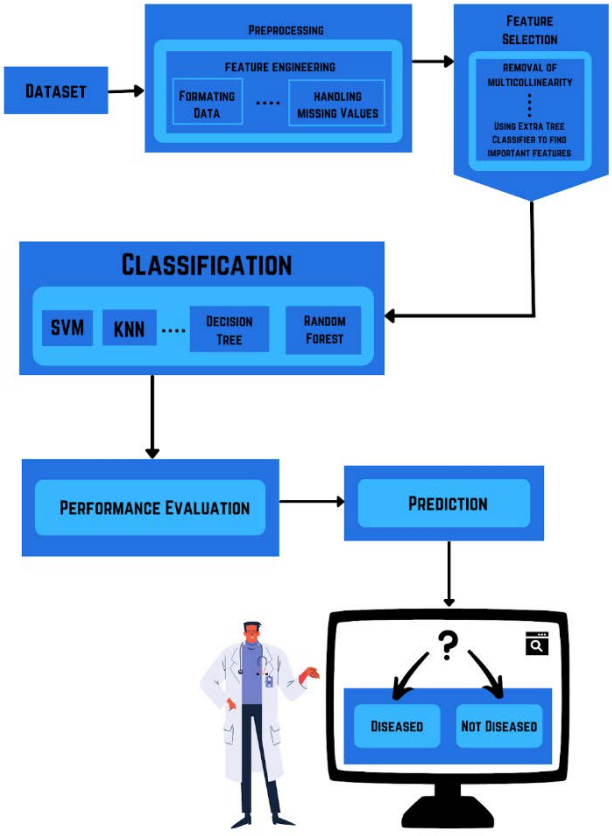

Fig. 1. Methodology.

B. *Pre-Processing*

Outliers and noise were present in the dataset, therefore it needed to be cleaned up in this stage. Estimating missing values and removing noise, outliers were all part of the preprocessing stage as was standardized scaling of variables, testing for unbalanced data, and variable encoding. The most straightforward way to deal with missing entries is to remove those entry or ignore the records, although this is ineffective on a tiny dataset. Instead of eliminating records, we have applied methods to compute missing values. Missing entries for numerical attributes can be calculated using statistical measures like mean, mode and median, whereas missing entries for categorical characteristics was calculated using the mode statistical approach, wherein the missing values are replaced with the most frequently occurred value in each of the attributes.

C. *Features Selection*

Here, key features with a high and positive association for disease diagnosis are identified, while features that are irrelevant meaning the features that do not contribute significantly for the prediction are eliminated from the dataset. These useless features will hinder the robust performance of the model as it increases the complexity of the model. Here, columns with high collinearity with each other were removed, and Extra Trees Classifier was used to find top features influencing the target, and those features were only used for prediction because they contributed most to the model's accuracy, and the achieved accuracy had minimal changes.

D. *Classification*

To create categorization templates, data mining and machine learning techniques were used to develop new, understandable and insightful patterns. The creation of machine learning models established on preceding analysis is required for both supervised and unsupervised learning approaches. These techniques are utilized for diagnostics in the medical industry, these models fall into the category of regression and classification. SVM, KNN, random forest, decision tree, logistic regression and boosting are popular ML algorithms that produced the best diagnostic findings. ML techniques are partitioned into two stages, the models work around these stages to build patterns which can then be used for classification. Two stages are: The training stage, in this stage the model is developed from the training dataset with the expected results. The second stage is the validation stage in which the constructed model is validated for its quality using a test dataset. All of the techniques are supervised methods for solving classification and regression issues.

E. *Splitting Dataset*

Dataset was divided into two parts namely the training dataset and testing dataset in the specific ratio to get a better trained model and then validation is done on the testing data.

F. *Building and deploying the GUI for the built models*

We planned to develop refined structure and user interface to the prediction model. To do this, the best model was uploaded to the backend of our live website, different conditions and parameters were added, and a basic simple and easy to use web application using HTML and CSS was developed, in which the user enters the values for the parameters as described. The app would then use these inputs provided for the prediction of the diseases. The app will then inform you of its essential prediction. The user would

receive the desired answers based on the analysis and be informed as to whether he or she is healthy or should seek medical advice.

Various machine learning models were developed using the UCI and Kaggle datasets with multiple features. In Python, the models were saved in a pickle file. Then with the help of Flask the web application was integrated with the model at the backend. Before being redirected to the form on that page, the user will be asked to select the condition he or she wants to check for. In the website's form, the user can fill out the essential information. The input is passed as a request to the models on the backend using flask, and the models revert the prediction, which is displayed in the result area of our website. The Flask web application was later released on the Heroku platform, which is a cloud-based platform for developing and running web applications. The outcome of the application is dependent on probability. Models will assess whether the person is healthy or in need of medical help. It will also be displayed in the results section of the website.

IV. Result and Analysis

A. *Evaluation Metrics*

$$\text{Accuracy} = \frac{\text{True Positives} + \text{True Negatives}}{\text{All Samples}}$$

$$\text{Precision} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Positives}}$$

$$\text{Recall} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Negatives}}$$

$$\text{F1 Score} = \frac{2 \times (\text{Precision} \times \text{Recall})}{\text{Precision} + \text{Recall}}$$

Fig. 2. Evaluation metrics.

The metrics for evaluation which are available in python were used to validate the performance of the classifiers. The confusion matrix is one of these metrics, from which the true negatives, true positives, false negative and false positives are displayed in a tabular form. Using this matrix accuracy, F1 score, recall and precision calculated by computing the properly categorised samples True Positives and True Negatives and the wrongly classified samples False Positives and False Negatives, as illustrated in the formulae above.

B. *Chronic Kidney Disease Classification*

Multiple models was used to find the best suitable algorithm to predict CKD. The model with the best result is the Random forest classifier. As the name implies, a random forest classifier comprised of massive number of individual decision trees that work together as an ensemble model. The class prediction of each tree in the random forest is aggregated and the class which has the most votes will be considered as the prediction of the model. It was chosen for our final CKD illness prediction because it performed better than

other models and had a 96 percent accuracy rate. The different models that were also considered were SVM, Logistic regression and Gradient boost which gave an accuracy of 90, 87.5 and 95 percent respectively.

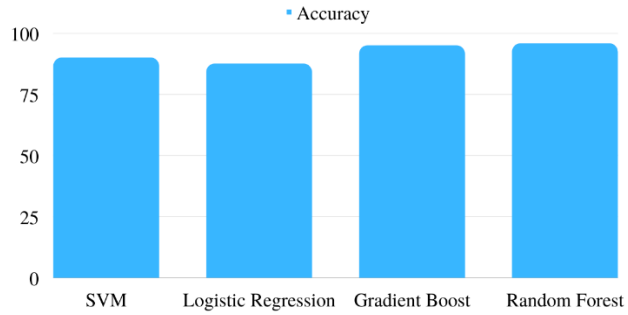

Fig. 3. Chronic Kidney Disease Model Accuracy.

C. *Heart Disease Classification*

SVM is used to predict cardiac disease. Support Vector Machine is a supervised data mining technique which is used for classification and regression techniques. It locates a hyper-plane that establishes a distinction between different data types. This hyper-plane is nothing more than a line in 2 dimensional space. When the dataset has two classes and is separable, linear SVM is utilised. Different kernels such as linear, RBF, poly, and sigmoid are used to forecast heart disease, and accuracy is calculated from them. SVM is used for final predictions since it performed better than other algorithms. Poly kernel obtained best accuracy for training data, but RBF kernel performed better than poly for testing data, hence SVM is used with RBF kernel for final output prediction. The different models that were also considered were KNN, Logistic regression and random forest which gave an accuracy of 79, 86 and 81 percent respectively.

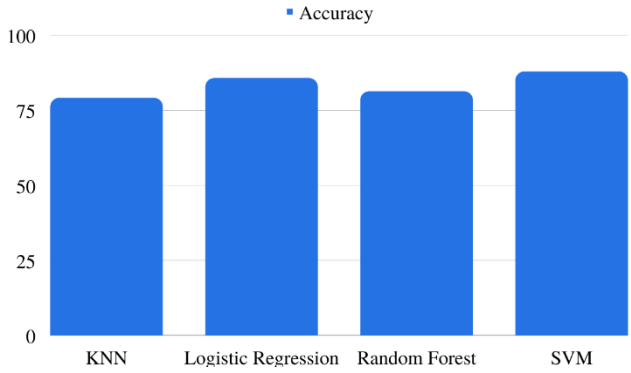

Fig. 4. Coronary Artery Disease Model Accuracy.

D. *Diabetes Classification*

Diabetes is detected using KNN. K Nearest Neighbours is a regression and classification algorithm and a machine learning technique. In order to predict which class a data point belongs to K-Nearest Neighbours analyses the labels of a specific number of observations neighbouring it. The Euclidean distance is used to determine the neighbours. Because it performed better than other models, with an accuracy of roughly 81 percent, it was picked for our final diabetes illness prediction. The different models that were also considered were SVM and random forest which gave an accuracy of 76 and 77 percent respectively.

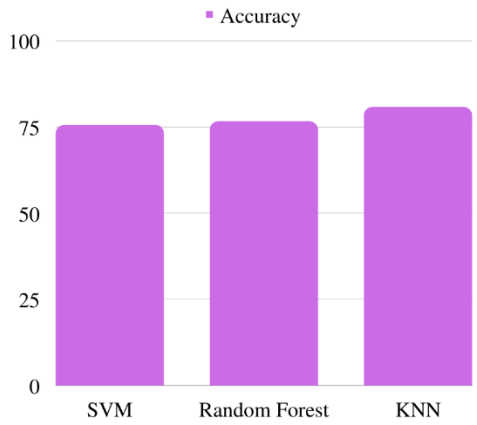

Fig. 5. Diabetes Disease Model Accuracy.

V. Limitation and Future Work

In the online web application, just three distinct diseases have been included. More illnesses can be anticipated and incorporated in the future utilizing data supplied by the medical sector. More real-time data which could be extracted from different sources could be used to keep updating the models to increase accuracy. Using data science approaches, a whole virtual healthcare system can be created. Doctor recommendation can be added for people to consult for additional medical assistance.

VI. Conclusion

In today's world, when everything is virtual, we devised a strategy to build a virtual healthcare system based on machine learning that can identify disease early on and avert life-threatening scenarios. The healthcare data collected every now and then in the Medicare industry may be handled quickly using big data analytics for illness prediction with minimal overhead. Predicting illnesses with greater overall accuracy allows more individuals to become aware of life-threatening diseases early on, allowing them to be treated at minimized costs and with less risk-factors. Effective feature engineering reduces the amount of attributes needed for the machine learning algorithms, this in turn reduces the number of medical tests that have to be taken up. Machine learning techniques have been used to provide a one-stop solution for forecasting certain chronic illnesses. This reduces reliance on hospitals by allowing patients to be tested for illness in the privacy of their own homes at minimal cost and with high accuracy.

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Heart Disease Prediction through ECG filtering and classification Methodologies based on Machine Learning and Deep Learning Techniques

[1]Raghavendra Badiger,[2]Dr. Prabhakar M

School of CSE, REVA University

[1]raghavendra.badiger1@gmail.com, [2]Prbhakar.m@reva.edu.in

Abstract.

Heart ailment affects around 1.5 billion people worldwide, making its early detection and prevention as one of the most critical duties for any health sector. For the identification and assessment of heart arrhythmias like atrial fibrillation, an electrocardiogram (ECG) is commonly employed. In order to deliver an accurate result, most computer-based automated cardiac anomaly tracking techniques need good recognition of ECG elements like QRS complexes. But, ECGs are frequently polluted by noise and aberrations, particularly when collected with wearable sensors, making reliable detection of QRS spikes difficult. The majority of current denoising approaches were tested using artificial noise applied to a clear ECG signal, and legitimately noisy ECG signals were not considered. Furthermore, most of them are perfect and sampling frequency based, and therefore takes a long time to compute. This study examines the core concepts of several denoising methods in depth. Likewise, ECG categorization is crucial in detecting and classifying heart abnormalities. Conventional signal processing approaches, as well as machine learning (ML) and its sub-categories, like deep learning, are common methods for analysing and categorizing ECG signals, with the goal of developing applications for the earlier identification and therapy of cardiac diseases and arrhythmia. This research paper provides a comprehensive analysis of the research on ECG signal assessment for arrhythmia categorization. Furthermore, comparative assessment is done in this work.

Keywords. ECG filtering, disease classification, machine learning, deep learning.

1. INTRODUCTION

Heart anomaly deaths are expected to rise to 2.34 billion by 2030, accounting for 35 percent of all fatalities (W.H.O, 2018) [1.] The cardiovascular disease (CVD) is the largest reason of death universally, causing over 30% of all fatalities. The heart is a muscular cone-shaped structure that pumps at periodic intervals to supply blood to the body's many organs [2, 3]. Heart attack is caused by a blockage in a blood vessel that supplies blood and oxygen to the heart. CVDs are mostly caused by poor nutrition, cholesterol, tobacco, and other changes in lifestyle. According to WHO main data, 7.4 million people died from heart attacks in 2015, with the majority of these deaths occurring

in poor and middle revenue economies [4, 5]. The fatality rate owing to cardiovascular disease in India is around 275 per 100,000 populations. With the existing burden of CVDs, India would lose $237 billion in production [5]. It is estimated that with good health care, 90 percent of CVDs can be avoided. As a result, a complete categorization approach at the national level is required for successful control of CVD risk variables.

The present heart diagnosis core includes clinical signs, ECG pattern analysis, and testing of essential cardiac troponins [6, 7]. ECG waveforms are tracings of the heart's electric activities, and they are significant diagnostic tool for assessing heart health. Much of cardiology and electrophysiology is based on the 12-lead ECG. With variations in the timing and structure of the captured waveforms, it offers special information about the anatomy and electrical conduction system of the heart, as well as overall diseases. Following ECG capture, computer-generated readings are routinely supplied, based on predetermined criteria and computational pattern classification [8]. Existing practices, on the other hand, miss many of the specialised insights and details that experienced cardiologists and electrophysiologists can notice. Doctor reads might be inaccurate and varies based on their experience. It would be a tremendous success, comparable to the development of dependable automated vehicles, to produce trustworthy ECG readings, not least in terms of safety, so that crucial and prompt ECG readings of severe cardiac problems can lead to quick and cost-effective action. To perform a comprehensive ECG assessment, you must be able to recognise the distinct waveforms and their connections, measure the epochs between the waveforms portraying particular electrical activities in various zones of the heart, identify the conditions that affect the anomalies seen on ECGs, comprehend the biology/physiology behind the rhythm disturbances, biologically localise the site of the disturbance, and make assumptions about the future.

A. Noise in ECG

The basic stage in the handling of an ECG signal is noise filtering [12]. The primary noise (PLI) should be reduced at the first phase of processing processes [13], is introduced by an alternating current source from a power source. The signal has a frequency of roughly 50/60 Hz, depending on the country location (Lin and Hu 2008). Europe and India use a 50 Hz AC supply, while the United States and a few other nations use a 60 Hz source. This noise is caused by the human's process of breathing, which causes the ECG signals to shift out of the baseline. Other possible factors include cable motion during ECG signal processing, dirty lead electrodes/wires, or a weak electrode connection [14]. Contraction of heart muscles leads to EMG (electromyogram) noise through ventricular depolarization waves created nearby the electrodes [15].

Contact noise is another sort of noise which is caused by the placement of the heart with reference to the electrodes variance. Baseline disturbances are caused by variations in the electrode–skin conductance [16]. The coupling of conductors, wiring, signal processor/amplifier, and ADC are the key factors of noise [16]. Nurses and doctors in hospitals do not give heed to electrode placement. As a result, common mode noise is produced, necessitating the usage of 50 Hz filtering. Below given figure depicts some most common types of artifact in the ECG signal.

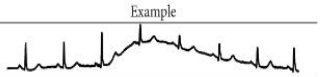
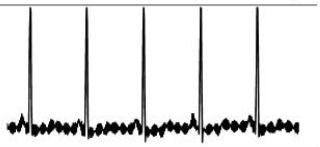
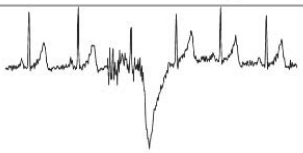
Artifacts	Description	Cause of artifact	Example
(1) Wandering baseline	A slow wander of the baseline	(i) Body movement (ii) Respiratory swing	
(2) AC interference	Varying amplitude of ECG and indistinct isoelectric baseline	(i) Electrical power Leakage (ii) Improper equipment grounding (iii) Close proximity of other electrical equipment	
(3) Muscle tremor	Narrow and rapid spike of ECG	(i) Effect of EMG signal (ii) Shivering (iii) Parkinson's disease	
(4) Motion artifact	Large swing in the baseline, uncertainty of large amplitude signals	(i) Effect of epidermal signal (ii) Stretching the epidermis (iii) Coughing (iv) Ambulation	

Fig.1. Artifacts in ECG signal

B. ECG, its application and arrhythmia recognition

The ECG captures the electrical activity produced by cardiac muscle depolarizations, which travel to the skin in the form of pulsing electrical waves. Despite the fact that the quantity of electricity is so little, it can be effectively detected with ECG electrodes applied to the skin [17]. P waves, QRS complex, and T waves make up the majority of ECG signals. Any rapid change in this value indicates that the heart is experiencing a problem, which could be caused by a variety of factors.

Below given table 1 describes these attributes briefly along with their normal duration.

Attribute	Description	Duration
P	First limited movement of ECG in upward direction	80 ms
PR	Connecting the P and R	50-120 ms
PQ	From P to beginning of QRS complex	120-200
RR	Interval between two consecutive R waves	0.6-1.2s
QRS	It generally starts with the downward movement of Q, larger upward movement of R and ends by forming the downside S wave	80-120
QT	Measured from beginning of QRS and end of T wave	420 ms
T	Modest upward movement of	160ms
ST	Connecting the QRS complex with T wave	80-120 ms

TABLE.I -CHARACTERISTIC OF VARIOUS SEGMENTS OF ECG SIGNAL

The ML algorithms are preferred over manual methods for better categorization results, but a useful algorithm is required to further reduce it [23, 24]. With the advancement of ML and deep learning (DL) techniques, it may be able to uncover formerly unidentified illness patterns. Several systems, such as EEG, ECG, and EMG, have been used to diagnose vital signs [25]. One of the most significant difficulties is the difficulty of organising physiological records, which is hampered by domain expertise, time constraints, and privacy concerns. Another issue is that ECG data is usually uneven, with a small number of labelled ECG signals for each condition, thus the training samples contain numerous normal ECG signals, making it hard to categorise the ECG signals with disorders due to the asymmetry in the initial data. Based on the characteristic of ECG signal, we can obtain the information about following abnormalities as mentioned in below given table 2

S.No.	Heart related abnormality	Attribute information obtained from ECG
1.	Tachycardia	If R-R interval < 0.6 s
2.	Bradycardia	If R-R interval >1.0 s
3.	Dextrocardia	Inverted P wave
4	Myocardial	Ischaemia Inverted T-wave
5	Sinoatrial block	Complete drop out of cycle
6	Hyperkalaemia	Tall T-wave and absence of P-wave
7	Hypercalcaemia	QRS interval 0.1s
8	Sudden cardia death	Irregular ECG

TABLE.II- Attributes and abnormality

Arrhythmias, in which the heartbeat pattern detracts from its normal pattern, are one of the most prevalent cardiovascular diseases. These abnormal patterns must be classified into subclasses, and this knowledge can be used to make exact cure recommendations to patients. The ECG is commonly utilized to identify and anticipate the abnormal behaviour of the heart of human in order to detect cardiologic illnesses.

C. Machine learning and its use in detecting heart abnormalities utilizing ECG signals

With the advancement of ML algorithms in recent times, a growing percentage of automatic identification approaches for arrhythmias have been implemented [3]. The ML approaches typically necessitate feature extraction by hand. After that, features are retrieved using a number of mathematical approaches like PCA, wavelet transform, LDA, ICA, and PCA. To perform the categorization, the collected characteristics are fed into a classifier [27, 28, and 29]. The SVM [30, 31], decision tree [32, 34], and artificial neural network [34] are examples of classifiers. Conventional ECG signal feature extraction algorithms are difficult to use and are limited by specific skill fields. Furthermore, the capacity to fit nonlinearly is limited. As a result, the retrieved features may not always reflect the best features, and even essential ECG signal information may be missing. The DL methods have been applied to the rapid recognition of arrhythmias to circumvent the drawbacks of ML techniques. Deep learning, unlike ML methods, does not need the manual retrieval of features. (CNNs are a sort of dDL methods that can mechanically retrieve significant aspects of ECG signals by stacked layers and aren't bound by domain expertise [17]. Authors in [35] developed a deep convolutional network for detecting arrhythmias, as well as focused loss to alleviate data imbalance difficulties. Authors in [36] suggested a CNN based ECG categorization approach in which fuzzy sets were employed to minimise the symmetry of retrieved ECG image characteristics, and the network was improved utilizing residual structures [36]. Furthermore, because of its superior enactment

in handling of temporal data, LSTM has been frequently used in the categorization of ECG signals. Kim and Pyun suggested a two-way LSTM-based automatic arrhythmia detection mechanism, and testing findings revealed that it outperformed classic LSTM [37]. Sharma et al. treated the RR interval using Fourier–Bessel expansion and then sent the modified data into the LSTM for ECG categorization, with effective outcomes [38].

D. Work contribution, objectives and organization

ECG signals play a significant role in health monitoring specifically, monitoring the health of heart. Currently, the demand of automated heart disease prediction systems has increased. In this field, ECG plays a significant role. Several techniques have been introduced for ECG filtering and classification. In this work, we study about these techniques of ECG signal filtering and classification. Moreover, we present a comparative analysis based on these techniques.

2. RELATED WORKS

A. ECG signal filtering procedures

The accumulated ECG signal is frequently mixed with a lot of noise, which makes signal analysis difficult. As a result, the most crucial step in data handling is to denoise the accumulated signal in order to improve its usefulness.

ECGs are frequently polluted by a number of noise sources, such as motion artefacts, poor electrode contact with the muscle, skin and PLI, all of which can affect ECG morphology and contribute to heart arrhythmia misidentification. Because of motion artefacts, noise is more pronounced in ECGs from hold able technology. As a result, removing noise and artefacts from ECG signals is extremely significant and essential to enhance the usefulness of ECGs. Alternatively, Denoising of ECG signals is difficult, particularly when the noise frequency and the signal frequency are the same. Numerous denoising methods have been recommended in this research area over the last few generations. DWT decomposition [39-42], adaptive filtering [12, 40], EMD and EEMD [41], NLM [43], and neural networks (NN) [23, 24] are the most well-developed approaches. While numerous approaches demonstrated positive denoising results, they each have their own set of benefits and drawbacks. The primary downside of adaptive filtering is that it needs an allusion signal that is not always accessible; likewise, the main drawback of NLMS is that its effectiveness relied upon the bandwidth selection of a parameter that relies upon the standard deviation of noise, which may not be accessible in actual time. Furthermore, DL centered techniques operate as a black box, necessitating additional data for training and being arithmetically costly. As a result, DL-based denoising might not be appropriate for actual circumstances, particularly in wearable gadget appliances.

In real applications, conventional noise filtering systems have some drawbacks. Noise removal approaches are frequently in a one-to-one association, which is insufficient to

address the real requirements of ECG signal noise removal. Kumar et al. [39], for instance, suggested a static wavelet transform-based denoising approach. Numerous investigations have been done on conventional ECG noise reduction techniques. Xiong et al. [40] investigated spectral power fluctuations through the motion artefact input process and developed a cosine transform DCT-LMS approach to eliminate mobility artefacts from the ECG. The noisy ECG signal is initially adjustably disintegrated into vibratory elements known as IMFs employing EMD or its variations, refer to El Bouny et al. [41]. As a result, through a novel parameter originated from the HOS, the 4th order cumulant or kurtosis, the acquired modes are divided into 2 sets: noisy signal modes and usable signal modes. Then, to minimise noise and maintain the QRS complex, a customized shrinkage method relies upon the Interval thresholding approach is dynamically implemented to every chosen IMF from the noise-dominant clusters. The total filtered ECG signal is then rebuilt by merging the threshold IMFs with the smaller frequency meaningful IMFs that were left untreated. Wang et al. [42] employ a filter bank with 2 adjustable Kalman filters (KF), one for denoising the big frequency QRS complex and the other for denoising the small frequency T and P waves. The EM algorithm is used to estimate and repeatedly update the parameters of these filters. They employed Bryson and Henrikson's methodology for the estimate and updating steps within the KF bank to deal with stochastic noises like muscular artefact (MA) noise. Singh et al. [43] used EMD to apply the NLM approach to deconstruct the signal into IMFs. To achieve the ultimate denoised output, the IMFs are then threshold using the immediate half period standard and soft-thresholding. In addition, to save time and money, the modified EMD is utilised instead of the normal EMD.

In the field of ECG noise reduction, DL has appealed an increasing number of in-depth research projects. Deep Filter is a DL BLW filtering solution developed by Romero et al. [44]. The suggested model is built on multipath modules and is completely convolutional. This method employs multipath modules, which stack many convolutional layers on top of each other and allow the backpropagation technique to select not just the weights but also the optimum route for the signal to take. The MKLANL filter component that is motivated by the beginning component has been used in this technique. Using a fully convolutional network, Chiang et al. [45] suggested a DAE (FCN). However, in terms of the DAE architecture, the suggested FCN-based DAE can conduct compression. Noise suppression based on Dl method is presented by Qiu et al. [46]. The process is broken into two parts, and two concepts are created for each level. A 1D U-net prototype is intended for ECG signal denoising in the initial step to remove as much noise as feasible. In the second part, the 1D DR-net model is utilised to rebuild the ECG signal and rectify the waveform deformation generated by the previous phase's reduction of noise. In this research, the convolution approach is used to build the U network and the DR network in order to perform complete projecting from noisy ECG signals to pure ECG signals. Several techniques are reported in this section. Below given table 3 shows the comparative analysis of this techniques.

B. Machine learning and deep learning centered procedures for ECG categorization

Deep neural networks (DNNs) have recently exhibited promise in the processing of ECG data [58], providing yet another possibility to increase the efficiency and flexibility of automated ECG categorization. The DNNs may incorporate multiple feature representations and classifiers to construct a complete multilayer model [59] based on various network structures, which can solve the limitations of classic ML method models with autonomous input and output. Furthermore, some new DNN approaches have been proposed, like residual blocks [60], DCNN [61], deep residual CNN [62], RNN with LSTM [37,54], and Bi-LSTM network [23,37, 38].

Duan et al. [63] presented a MADNN technique to improve the ability of retrieving ECG characteristics on multiple scales by merging kernel and branch-wise attention components, resulting in a complete score of 0.447 on the concealed testing set. By combining remaining CNN and a class-wise attention method, Liu et al. [64] suggested a unique multilevel classifier for twelve lead ECG records that can achieve challenge metric scores of 0.5501 0.0223, suggesting a promising approach for ECG classification. He et al. [65] employed the attention method to acquire an attention distribution on a record of retrieved characteristics, and then combined the attention coefficients into one feature vector and utilized for concluding prediction. By using Deep Heart system, the complete score with 5 cross confirmation of the training set is approximately 0.55, indicating that it has prospective real-world applications. Therefore, there it is difficult to get clinical application categorization precision.

The CNN and RNN are utilised by Wang et al. [49] to combine space and time information from ECG data. These networks, on the other hand, neglect the various contributions of global and local segments of an ECG feature map, as well as the correlation link between the two. A novel CNN with NCBAM is suggested to autonomously categorize ECG heartbeats in order to address this issue. A thirty three layer CNN model is followed by an NCBAM component in this technique. To recover spatial and channel information, pre-processed electrocardiogram (ECG) signals are input into the CNN framework.

Chen et al. [50] propose an automated technique for distinguishing between normal and abnormal ECG readings. The authors present a multi-channel multi-scale DNN framework that is a complete framework for classifying ECG data without the need for feature extraction. To increase the performance of the DNN model, convolutional layers are employed to mine key characteristics, and LSTM and attention are integrated.

They have divided ECG signals into separate pulses, collected characteristics from every pulse, and then categorised these pulses using ML approaches, as Sharma et al. [51] built a separator for computerized identification of patients with HCM. The authors defined a patient as having HCM if the number of HCM heartbeats was equal to as or more than the number of control heartbeats. Authors retrieved previously utilised features and

few fresh morphological characteristics from ECG signals for this categorization experiment. The authors used random forests and SVM classifiers to discriminate between HCM and non-HCM patients' heartbeats.

Gaddam et al. [52] developed a DL based method for categorising various cardiac arrhythmias. With the use of Continuous Wavelet, 1-D ECG signals are first translated into 2-D scalogram images (CWT). To test the suggested technique, four distinct types of ECG waveforms were chosen: arrhythmia datasets, Normal Sinus Rhythm dataset and BIDMC congested cardiac arrest dataset. The purpose of this study is to elaborate a transferable DL procedure for automatic classification of the 4 cardiac illnesses stated above. When compared to other approaches, this scheme uses 2D scalogram images to train the deep CNN and displays superior efficiency.

Maghawry et al. [53] stated that, it's difficult to find the best setup for a Dl system for a certain issue area. The purpose of this study is to deliver an operative method for classifying cardiac heartbeats into 5 categories using an optimised CNN. A customised evolutionary algorithm was used to find the best structure of hyper parameter values for the CNN model. This technique does not involve any pre-processing of ECG readings. To counteract the dataset's uneven nature, the resampling method is used. The classification performance of this technique was 98.45 percent.

Jiang et al. [57] developed a method for automatically implementing ECG categorization using a hybrid HADL network. The HADLN approach was validated using data from the PhysioNet 2017 competition. This paper's primary contributions can be summarised as follows: (1) The ResNet portion extracts local features by superimposing 16 residual blocks, while the bidirectional LSTM network extracts global characteristics in parallel. Furthermore, the universal characteristic from Bi-LSTM and the local feature from Res Network were fused characteristics, that were able to mine numerous characteristics from the initial ECG data; (2) in this article, an alteration of the basic attention method was postulated to empower local feature representations from Res-Network using weight parameters measured from compound characteristics.

Achieving better classification with less computational complexity is a tedious task. Several deep learning based techniques are reported in this section, we present a comparative study based on these techniques. Below given table 3shows the comparative analysis.

Author	**Objective**	***Technique***	**Performance (max or min values in experiments)**
Wang et al. [49]	ECG classification	CNN with on-local convolutional block attention module	AUC=0.9314 F_{max} =0.8507
Chen et al. [50]	ECG classification	Multi-channel with DNN	NA
Sharma et al. [51]	Segmentation and arrhythmia disease classification	Hybrid of deep learning method and cuckoo search algorithm	Accuracy=98.53% precision = 98.24 Recall = 95.68%
Gaddam et al. [52]	Arrhythmias	Transferred Deep Learning with Continuous Wavelet(CWT)	Accuracy =95.67% Precision = 93.12% Sensitivity=94.21% Specificity=95.31%
Maghawry et al. [53]	Heartbeats segmentation Classifier	Optimization with genetic algorithm and CNN	Accuracy= 98.45%
Pokaprakarn et al. [54]	Cardiac Rhythm Classification	CNN with RNN configuration	F1 score =0.89
Ganeshkumar et al. [55]	ECG classification	Grad-CAM technique to obtain the activation maps for class and trained by CNN	Precision = 0.986 Recall = 0.949 F1-score = 0.967 Accuracy = 96.2%
Essa et al. [56]	ECG segmentation and classification	Two technique: CNN-LSTM and (RRHOS-LSTM	Accuracy= 95.81% Sensitivity= 98.03 Specificity = 80.27
Jiang et al. [57]	Arrhythmia Classification	Combination of ResNet and Bi-LSTM with attention mechanism	Precision =0.866 Recall =0.859 Accuracy =0.867 F1-score = 0.880
Hong et al. [59]	Heart disease prediction	MultIlevelkNowledge-guided Attention	ROC-AUC=0.9488 ± 0.0081

		networks	PR-AUC=0.9436 ± 0.0082 F1=0.8342 ± 0.0352
Li et al. [62]	Heartbeat classification	deep residual network (ResNet)	Accuracy= 99.06% Sensitivity= 93.21% positive predictivity= 96.76%
Duan et al. [63]	Arrhythmia classification	Multi-scale deep neural network	validation score = 0.446, full test set score = 0.236
He et al. [65]	Arrhythmias	DNN with Gated Recurrent Unit (BiGRU)	

TABLE.III - COMPARATIVE ANALYSIS FOR DEEP LEARNING TECHNIQUES

3. CONCLUSION

The ECG is a useful technique for detecting problems in cardiac function. Early detection of myocardial infarction (MI) can protect lives and is a difficult undertaking, however computerized analysis of MI can be performed with ECG examination and categorization using CAD and machine learning approaches. These ECG signals, on the other hand, are subject to sounds such as WGN, coloured noise, PLI, baseline wander, electrode noise, and muscular artefact, among others. As a result, we investigated state-of-the-art ECG filtering algorithms and conducted a comparative analysis to highlight existing techniques' limitations.

In addition, this study provided a thorough examination of various classical and ML techniques utilised in each level of ECG signal processing, particularly for the ECG categorization process. The ML algorithms for detecting ECG fiduciary details like R-peaks and QRS complexes have been proposed, both fully automated and partially automated. In a recently published study, deep learning algorithms produce more efficient recognition and categorization outcomes. In this paper, we established a phases-centered framework for ECG signal study, where the majority of ECG literature can be classified into one or more phases of a project. Scholars are engaged to the vast body of ECG research literature in this survey paper to gain insights into how the ECG signal passes through various phases/procedures, what is comprised in every phase in context of data

attainment, and the methodologies and procedures associated with every phase of ECG signal study. A number of hardware and software tools for this type of research have also been described. The significant obstacles and constraints have also been explored.

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REAL TIME FATIGUE LEVEL MONITORING SYSTEM OF DRIVER USING IMAGE PROCESSING

Giridhar Vicky S R (R18CS513)[#1], Gouthami S (R18CS514)[#2], Yuvraj Shaurya Singh Rana (R18CS478)[#3], Bhulakshmi[4]

[1]r18cs513@cit.reva.edu.in, [2]r18cs514@cit.reva.edu.in, [3]r18cs478@cit.reva.edu.in, [4]bhulakshmi.d@reva.edu.in

Abstract

Accident counts because of Driver's drowsiness has increased lately in the recent times. A large count of traffic accidents occur due to drivers falling asleep while driving, causing the vehicle to lose control. Early indicators of exhaustion and drowsiness could be noticed before a problem emerges. An immediate method for estimating driver's fatigue is estimating the condition of the driver i.e., his/her drowsiness. To save the driver's life and property, it is critical to recognize drowsiness. Such accidents could be avoided using an automated system that can detect the Fatigue level of driver. This can be made easier by using python implemented in RaspberryPi which will be able to trigger an alert/alarm so the Driver can be alerted before any damage/accident has been caused. The project mainly aims to achieve the highest level of predictable accuracy of a Driver's fatigue level. The proposed system is highly beneficial in automobile business industry markets.

Keywords: Deep Learning; Drowsiness; Python; RaspberryPi; Image Processing; Fatigue detection; Facial landmark detection; Real time video surveillance.

1. INTRODUCTION

In today's technologically advanced automobiles, the driver's and passengers' safety is paramount. Automobile companies are under a lot of pressure in today's environment to establish a competitive advantage in order to achieve business goals and stay competitive.

This Proposed system can be used in automobile organizations to detect drowsiness of drivers and alert them in prevention of severe damage, to them or their surroundings, hence serving the organizations & their customers an advantage towards safety. The basic and foremost technique used in this detection system is the Deep Learning methods, which is well known as the most suitable method for facial detections. DLIB & OpenCV's DNN module make the system more user friendly. The suggested system is a real-time system that continuously records images. It uses the openCV and dlib libraries in the Python IDE to measure the status of the eye and mouth according to the defined algorithm.

In this project, the facial spots are utilized to identify the eye closure and yawn detection. The face is marked into 68 co-ordinates. Eye closure is distinguished by assessing the EAR

value. At the point when EAR value goes under a specific threshold (0.2) eye closure will be identified. The yawn is recognized by assessing the MAR (Mouth Aspect Ratio) value. At the point when the MAR value goes over the limit (0.5) threshold, yawn will be identified. To differentiate b/w the eye blink and slight sleep, EAR value should be lower than the threshold for specific period which is set as 20 frames. The contrast between eye blink and light sleep can be found by plotting the EAR graph. The model can work when the eye and mouth are found and works in enveloping lighting conditions as well.

The identification of driver fatigue has become a popular study area in recent years. Subjective and objective detection are the two types of detecting methods. A motorist should take part in the subjective detection method's evaluation. Huge amounts of data about the driver are acquired using the objective detection method. These data are used to calculate the drowsiness of drivers, which aids drivers in planning their schedules appropriately.

II. LITERATURE SURVEY

As indicated by ongoing figures, drowsiness related impacts/collisions result about 1,200 deaths and 76,000 wounds each year [5]. In the subject of accident-prevention systems, creating answers for recognizing and avoiding drowsiness is a challenge on a serious note.

There is a discussion on drowsiness systems studies. The results of a routine check of driver collision avoidance systems that monitor the length of eye blinks were provided [1]. This innovation utilizes a webcam mounted straightforwardly before the driver's seat to recognize the blinking of the eyes and matches them to a specific EAR (Eye Aspect Ratio). The investigation in [2] was done to see what variables were connected with sleepiness. data was trained in numerous layers, and the system vigorously depended on mouth arrangement. The development is seen in [3]. The development of a synchronized system for detecting tiredness began. The faces of the drivers along the detecting path were targeted by the image from the video. Predefined procedures were used to identify the targeted points on the face, including eye operations. Random Forest has an 84% success rate with empirical results. Reference [4] inspected how to characterize a driver's alert positions, which are for the most part sleepy, by consolidating vehicle data, responses, and tangible pointers with examination, and afterward executing these recognizable pieces of proof in the acknowledgment framework. The level of sleepiness of the driver was determined by demonstration of drivers physical behaviors. Using a data set, the algorithm accurately predicted drowsy driving acquired over ten seconds. In [5], a mobile driver sleepiness estimation arrangement was used. The electrocardiogram (ECG) was constrained to a specific printed circuit board (PCB) configuration throughout development. The PCB was put in place and a 2-channel solution was used.

An automatic appearance was utilized to detect driver weariness in [6]. To forecast tiredness, a camera followed the driver's eye. Each time the driver fell asleep, he was awoken by a signal. It suggested that one is sleeping after failing twenty frames. A convolutional neural network was used in [7] to detect targeted eyes with next to mouth features. They employed the proportion of the eyes as well as the function of the lips to discover weariness. Reference [8] looked studied variables such uninterrupted driving time, uninterrupted rest, and a sleep before driving to predict driver drowsiness. Through

particular indicators of fatigue reactions, the researcher was able to acquire the truth about the driver's attitude through physical engagement.

III. COMPONENTS

HARDWARE REQUIREMENTS:

- Internet connection-Not required
- Operating system-Windows7 or later
- RaspberryPi Board
- Web camera
- Alarm beeper

SOFTWARE REQUIREMENTS:

- Python
- PyCharm
- RaspberryPi Stimulator

IV. METHODOLOGY

Eye closure detection and yawn detection are fully covered by the proposed Fatigue detection model. The project uses the dlib facial landmark detector in an OpenCV context. The driver's face is constantly observed, and frames are collected using a webcam. The OpenCV environment is used to process the collected image. The initial step in detecting drowsiness is to use a webcam to detect the face. The Facial landmark detection concept then detects facial expressions such as eye closure, yawning, speaking, eating, and head posture. The system receives the image captured and processes it. It uses OpenCV to convert the incoming image into a digital signal. Estimating EAR is used to identify eye closure (Eye Aspect Ratio). Drowsiness is confirmed when EAR falls below the threshold value, and the driver is notified. The yawning is found by estimating the Mouth Aspect Ratio (MAR). Yawning is confirmed when the MAR value exceeds the threshold value.

A. Facial Landmarks detection:

Face alignment, head pose estimation, face switching, blink detection, and many other applications use facial landmarks successfully. ROI detection uses an input image to locate important areas of interest along the shape.

Facial landmark detection is a two-step procedure:

Step 1: Determine the location of the face in the image.

Step 2: ROI detection is used to identify the important facial structures on the face.

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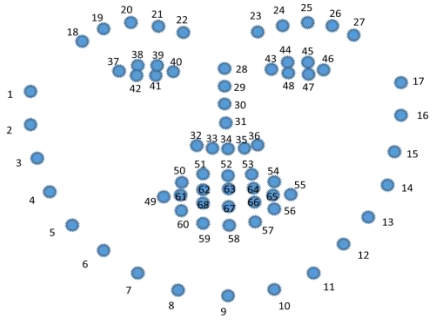


Fig 4.1.1. Visualization of the 68 facial landmark co-ordinates

The facial detection is done in the Python IDE using the dlib python library module and OpenCV. Dlib is a pre-trained library in python that is used to detect facial landmark. Dlib estimates the placement of 68 coordinates (x, y) which map the facial points on a person's face.

B. Eye Closure Detection:

The face is captured continuously with a webcam, and the captured frames are analyzed in an OpenCV environment. Using the dlib facial landmark detector, the face is identified and essential facial features are retrieved. In the frame, the landmark indices for both eye areas are emphasized. The Eye Aspect Ratio (EAR) is calculated in real time and is shown in the frame. The EAR value will be high after the eyes are opened. As the eyes close, the EAR levels decrease. Eye closure is detected when the EAR value falls below a specific threshold. The driver is notified by the alarm when the driver's eyes are closed.

C. Eye Aspect Ratio (EAR):

The aspect ratio of the eye region is referred to as EAR, and it is commonly used to measure the temporal consistency and speed of left and right eye blinks, as well as to detect drowsiness. These coordinates are needed to calculate EAR's value. [36,37,38,39,40,41] Landmark indices for the right eye [42,43,44,45,46,47] Landmark indices for the left eye.

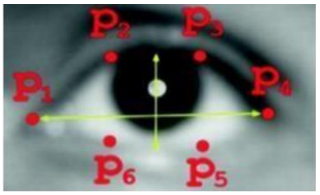


Fig 4.3.1 Landmarks when eyes opened

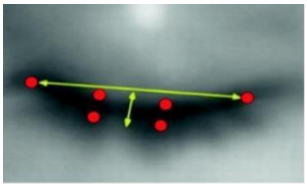


Fig 4.3.2 landmarks when eyes closed

The formula used to calculate the Eye Aspect Ratio (EAR) is given below:

$$EAR = \frac{|p2-p6|+|p3-p5|}{|p1-p4|}$$

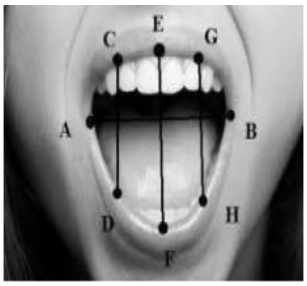
As the eyes close, the EAR value decreases.

D. Yawn Detection :

A webcam is used to capture the face, which is then analyzed in the OpenCV environment. The indicators of mouth landmarks are identified and highlighted. The MAR (Mouth Aspect Ratio) is calculated. The MAR value is decreased while the mouth is closed. When the driver yawns, the MAR value rises. Yawning will be identified when the MAR value rises above the threshold value. The driver is triggered by an alarm when the yawning is detected.

E. Mouth Aspect Ratio(MAR):

The Mouth Aspect Ratio is the proportion of the mouth's vertical to horizontal distance. In MAR estimation, 3 vertical distances and 1 horizontal distance are taken into account. When the driver yawns, the vertical distances increase, while the horizontal distance decreases slightly. For a successful detection, the MAR value for a yawning person is considered to be more than 0.43, whereas MAR values less than the threshold are omitted.



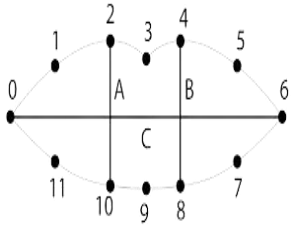


Fig 4.5.1 & Fig 4.5.2. Landmark indices for mouth region

The formula to estimate the Mouth Aspect Ratio (MAR) is given below:

$$MAR = \frac{|CD|+|EF|+|GH|}{3*|AB|}$$

The MAR value will increase upon yawning.

2. SYSTEM DESIGN

2.1. *Facial landmark Detection Design:*

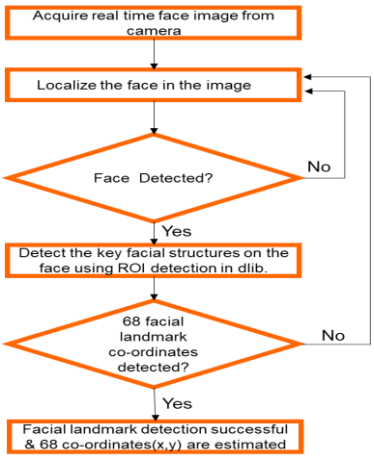


Fig 5.1.1 Process flow of facial landmark detection design

2.2. *Eye Closure Detection Design:*

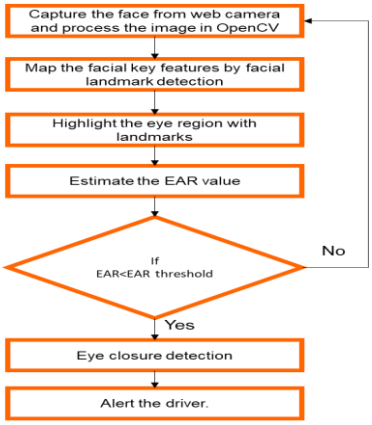


Fig 5.2.1 Process flow of Eye closure detection design.

2.3. *Mouth Closure Detection Design:*

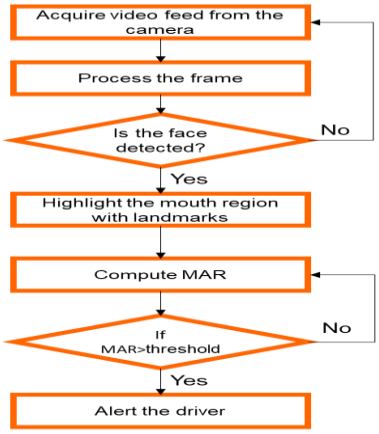


Fig 5.3.1 Process flow of Mouth closure detection design.

3. RESULTS

In comparison with the model in [4] which has better empirical results than the other references, our real time fatigue level monitoring system of driver using image processing gives us an output with up to 94.66% for eye blink prediction and 95.99% for yawn detection, while the real time model predicts an average of 93.5% accuracy. Below mentioned is the empirical results of our real time system.

A. Facial landmark detection output:

The proposed work begins with the detection of facial landmarks in the face. To separate the landmark spots from the facial attributes in the face. Figure 6.1.1 depicts the detected output. As illustrated in the figure, the entire face is marked with 68 landmark co-ordinates.

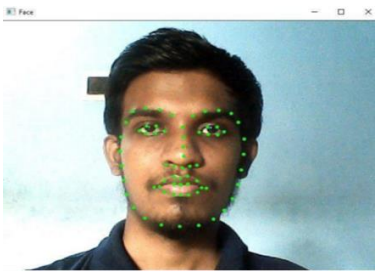


Fig 6.1.1 Facial Landmarks Detection

B. Eye closure detection outputs:

When the eyes are opened, the EAR value will be higher, as shown in Fig. 6.2.1. When the eye is closed, the EAR value begins to decrease. The EAR threshold has been set to 0.2. When the EAR is less than 0.2, it is assured that the eyes are closed. It could be an eye blink or a light nap. To prove the driver's drowsiness, the EAR value must fall below the threshold for 20 consecutive frames. The system will trigger an alarm if drowsiness is detected, as shown in Fig. 6.2.2.

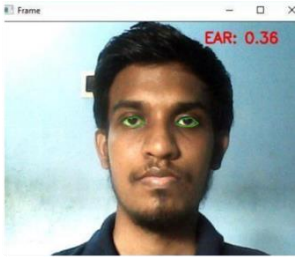


Fig 6.2.1 Output when eyes are open

Fig 6.2.2 Output when eyes are closed

C. Eye Aspect ratio Response :

The graph is drawn b/w the frames and the value of EAR at each frame. The plot's response is depicted in Fig 6.3.1. matplot library was used to create the graph. A new list is created, which is empty. In that list, the EAR value for each frame is appended. Finally, the list includes the EAR values for each frame. The graphic depicts the distinction between blink and light sleep. For drowsiness confirmation, the EAR value must remain low for 20 consecutive frames in a row.

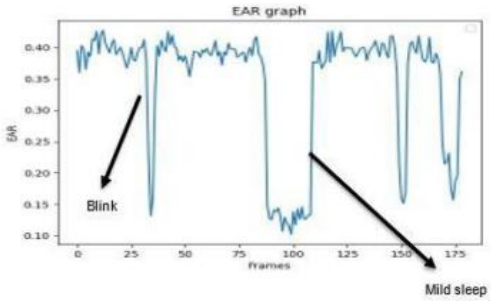


Fig 6.3.1. EAR plot.

D. Yawn Detection:

The MAR will result in lesser value when the mouth is closed. Whenever mouth is opened MAR will result in incremented values. The threshold limit of MAR is set to 0.5. At the point when MAR goes over 0.5, yawning is assured, and alarm is sent to the sleepy driver. The results when mouth is closed and opened are displayed in the Fig 6.4.1 and Fig 6.4.2 individually.

Fig 6.4.1 Output when mouth is closed

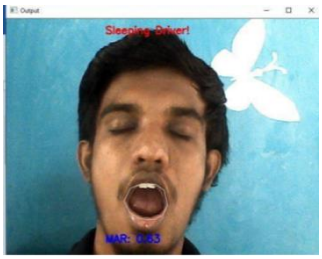


Fig 6.4.2 Output when mouth is open

E. MAR Response:

A graph with frames and MAR values at each frame is displayed. The graph's response is depicted in Fig. 6.5.1. As seen in Fig, the MAR threshold value is set to 0.5.

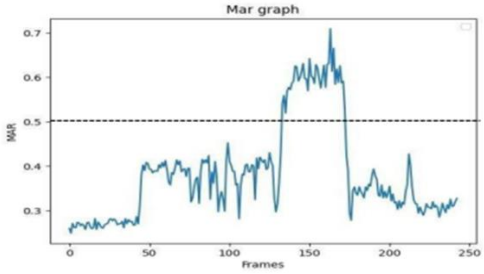


Fig 6.5.1. MAR plot

4. CONCLUSION

The suggested "Driver Fatigue Detector" system is a real-time device with a fast response time. According to the results of the experiment, the system is applicable in a variety of situations and provides consistent performance. When a drivers fatigue level exceeds a particular threshold, this real-time driver fatigue monitoring technology triggers an alarm so the driver can slow down. It continuously analyses the driver's level of drowsiness, and when that level surpasses a specified threshold, an alarm is triggered to notify the driver.

The accuracy of sleepiness detection is determined by counting the number of times individual samples' eyes blink and yawn. The results of eye blink detection and yawn detection are tabulated. Eye blink detection accuracy is predicted to be 94.66 percent. The yawn detection accuracy is predicted to be as follows 95.99 per cent. Most of the time, the system accurately detects eye blinks and yawns. The technology also performs well in low-light situations. The system is quick, and once it starts taking pictures, it continues to recognize faces and do detection until it is stopped.

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Implementation of Novel Deep Learning Model for Covid Opinion Mining In Social Media

[1]Karthikgowda H S, [2] Dr. Sasidhar Babu Suvanam,[3] Dr. Vijayalakshmi Yellepeddi

School of Computer Science and Engineering, REVA University, Bangalore

Department of Computer Science, Bishop Cotton Academy of Professional Management, Bangalore

[1]karthikgowdahs27@gmail.com, [2]sasidharmails2@gmail.com, [3]vijayasasi11@gmail.com

Abstract.

Without a doubt, (COVID-19) has caused probably the greatest test, all things considered. The continuous COVID-19 pandemic has caused in excess of 150 million contaminated cases and 1,000,000 passing's internationally as of May 5, 2021. Understanding the opinion of individuals communicated in their virtual entertainment remarks can help in checking, controlling, and eventually annihilating the infection. This is a touchy matter as the danger of irresistible illness altogether influences the manner in which individuals think and act in different ways. In this review, we proposed a clever technique in view of the combination of profound learning and traditional managed AI model for computerized extraction of COVID-19-related conversations from online entertainment and a Natural language process (NLP) strategy in light of subject displaying to reveal different issues connected with COVID19 from general assessment with feeling examination of Covid related from web-based Entertainment. Additionally, we examined Covid related popular assessment to all the more likely comprehend the adjustment of the opinion design at various settings. Our discoveries uncover that the Covid pulled in the consideration of individuals from various nations at various times in fluctuating forces. Additionally, the opinion in their tweets is associated to the information and unwavering quality and occasions happened in their nations including the quantity of recently tainted cases, number of recuperations and passings. Also, normal opinion examples can be seen in different nations during the spread of the infection. We accept that different online entertainment stages significantly affect raising individuals' mindfulness about the significance of this illness as well as advancing preventive measures among individuals in the community. Our proposed model result is to carry the Deep learning model with high exactness to perform opinion and phony news location about Covid over web-based entertainment.

Keywords COVID-19; classification, Sentiment Analysis; Topic Modeling; Machine Learning; Deep Learning Natural Language Processing.

1. INTRODUCTION

The Covid illness (COVID-19) has spread quickly all through the world since it was first found in China. The World Health Organization (WHO) announced the COVID-19 flare-up a worldwide wellbeing crisis [1]. In light of the aftereffects of the COVID-19 circumstance report beginning from the authority WHO site on June 1, 2020, the COVID-19 flare-up has brought about in excess of 6,000,000 affirmed cases and more than 371,000 passings worldwide [2]. Research connected with general wellbeing investigation and public discussions on the spread of COVID-19 via virtual entertainment is additionally one of the features of exploration around the world. Online entertainment can spread disinformation about the infection. It was powering alarm and making the supposed infodemics [3].Moreover, online entertainment has for some time been perceived as a significant spreader of wellbeing falsehood [4]. Web-based entertainment use as a wellspring of data isn't managed. It can prompt wellbeing gambles through the spread of paranoid notion, which cause concerns with respect to spread of the COVID-19 paranoid fear on virtual entertainment [5]. Investigating public discussion will help the significant specialists get popular assessment and data holes among them and the public [6], assisting them with creating fitting crisis reaction systems to address existing issues locally during the pandemic [7]. Also, examining opinion examination can give data on the populace's feeling in various context [8].

This study expects to comprehend general wellbeing by investigating the opinion and point displaying of Indonesian public discussions on Twitter about the COVID-19 utilizing the NLP procedure. We applied a few modelling to examine the systemg, like Logistic regression,Random Forest and Deep Learning Model , to acquire the best classification model.

Past investigations of general wellbeing and local area discussions were completed utilizing managed text based information examination. In 2020 [9], Sear et al. dissected the rise and advancement of subjects around COVID-19 on Facebook Pages utilizing Latent Dirichlet Allocation (LDA). In that review, LDA was capable to recognize themes that appear to be legit in an assortment of posts from online social media around the immunization and COVID-19 discussions. It was likewise ready to deal with enormous information, and the brief outcomes were gotten utilizing measurable bunching methods, rather than having to depend on possibly one-sided, slow, and costly human classification class.

Presently the examination question/heading that comes out is to propose an effective profound brain organization model for the opinion order task. So this work centres around point demonstrating and intermittent brain network-based approaches for ABSA. We have picked LDA (Latent Dirichlet assignment), the most famous solo subject model, and LSTM intermittent brain organization. LDA is broadly utilized for solo theme mining, and LSTM ready to handle long haul conditions. Following are the contribution of this paper:

1. A hybrid deep learning model in view of point demonstrating and repetitive neural network is proposed for sentiment examination .
2. A productive multi-facet Bi-LSTM is proposed for opinion order with just two stacked layers for keeping the model less convoluted.

3. Incline climbing-based approach is proposed for tunning as far as possible model to get to the strong the proposed model's accuracy. Set up embeddings like Glove is utilized to encourage capacity furthermore.
4. A Comparative investigation utilizing different datasets is introduced, showing the exhibition improvement of the proposed approach.

The main objective of the proposed work is its proficiency with higher accuracy. Our discoveries shed light on the significance of utilizing public opinions and appropriate computational strategies to get issues encompassing COVID-19 and to direct related navigation. Generally speaking, the paper is organized as follows. To begin with, we give a short prologue to online media social discussions. Conversation of COVID-19-related issues and a few comparative works are given in area II. In area III, we depict the information pre-handling techniques embraced in our exploration, and the NLP and profound learning techniques applied to the COVID-19 remarks information base. Then, we present the outcomes and conversation. At long last, we close and examine future works in light of NLP approaches for investigating the online local area according to the subject of COVID-1.

2. RELATED WORKS

Since the episode of the Covid pandemic, scientists have talked about its starting point, impacts, and patterns. This segment presents the tweet feeling examination utilizing different ML, DL, and NLP techniques. Separating significant data from boisterous information is a difficult errand. Steps involved in machine and deep learning models are utilized higher side to perform of the classification problem(17).Various social media propagates the news in that twitter plays major role as it used by most user around the world(18).As per the survey outcome from various county in India alone around 26000 tweets is spread about the Covid-19 in the twitter platform. Those opinions collected from the twitter is expression of people emotions towards covid 19 spread and regards to this pandemic, and they didn't perform tests utilizing ML methods.

One more examination zeroed in on the subjects and feelings of individuals communicated about the pandemic on covid is spread on twitter which is highly negative sentiment sometimes it also paper neutral opinion, at that point, investigated these tweets for feeling characterization utilizing different capabilities and classifiers. This work utilized just a single assessment metric, which is precise, and acquired the most elevated exactness utilizing BERT model ie Bidirectional Encoder Representations from Transformers which provides the accuracy of which is 93%. Some of the time, we use just characterization precision to survey our model's presentation; however this process lacking to proceed with proposed classification model utilizing accuracy, review, and F1-score alongside exactness (1).One more examination work zeroed in on the mental impact about the pandemic due to disaster of the real characteristic of nature in that aspect nature wins the human behaviour towards the nature way of behaving (20). It investigated that individuals are in emergency due to Covid and expanded nervousness levels due to COVID-19 news.

Different examinations show investigation about the modern emergency and monetary effect of the COVID-19 emergency across businesses and nations (21). Throughout the course of recent years, feeling examination in light of tweets has been used in various applications because of the enormous measure of information gathered from different virtual entertainment stages (22). It incorporates Twitter, Facebook, Reddit, and YouTube. The examination shows blemishes in the gathered data (23). Different ML and DL classifiers test the short and long text data. For assessment of a short text, calculated relapse, and Naive Bayes give normal aftereffects of 74 and 91%, individually, however on account of long text testing, both the models performed ineffectively (24). As of late, individuals have been intensely reliant upon web-based entertainment news, and they are conveying their perspectives, feeling, and sentiments about this original infection through virtual entertainment posting (25).

The new COVID-19 examinations depend on general assessment, feeling, and opinion investigation in English web-based entertainment opinion over the media with social communication. Our proposed model facilitate with deep learning model with pre trained data using LSTM model to bring the best F1-score and accuracy when compare with the other machine learning algorithms like random forest, logistic regression for opinion feeling recognition (26). Online entertainment stages, for example, Reddit permits medical care specialist organizations to gather information connected with general assessments, which can be utilized for human conduct examination and information revelation. This study presents a conventional methodology in view with respect to natural language about the covid-19 opinion to achieve the classification by Zhang et al. (28) at a post level over the media. This system relates all the sentiment about the opinion with wordnet strategies to better assessment about the classification model.so this proposed strategies mainly focused on evaluating the sentences Eextricated highlights is been measured by the recurrence during the audits. Other creators give synopsis in light of highlights. They recognized the main elements such as F1 score 83.4% over the dataset using LSTM modelfrom the dataset and accomplished the best F1-score of 83.6% utilizing the BILSTM model. Recurrent NN model implemented with natural language system to get the better investigation in full duplex way according to Mukherjee et al. (29).Using Deep learning with NLP has lots of work has achieved to extract the opinion of the tweets and evaluate the performance analysis on the classification results (30).Deep learning mode such us LSTM shows higher accuracy on the covid dataset of around 140 observation about the user opinion in social media so far almost 1 million observation from individual tweets is been collected and extracted the safeguard unit in covid They additionally proposed system of natural language to break down with development of positive social media opinion. Proposed investigation observes well-known subjects about the online post from all the earlier work. Similarly detailed standard discoveries the online opinions utilizing NLP draws near. Our research main focus to propose the integration of machine and deep learning mode to perform the sentiment analysis upon tweet propagated in the social media. Our implementation shows significant list of capabilities fully intent on further developing precision. The recommended framework inspects the feelings of gathered tweets for opinion arrangement and concentrates the main capabilities, which helps with further developing grouping results when contrasted with the pattern method.

3. PROPOSED METHODOLOGY

This segment explains the strategies used to examine the fundamental commitments to this review, which proposes the utilization of an unsupervised subject model, with a cooperative profound learning model in view of LSTN to examine COVID-19-related remarks from sub-reddits. The created system, shown in Fig. 1, involves feeling and semantic investigation for mining and assessment examination of COVID-19-related remark.

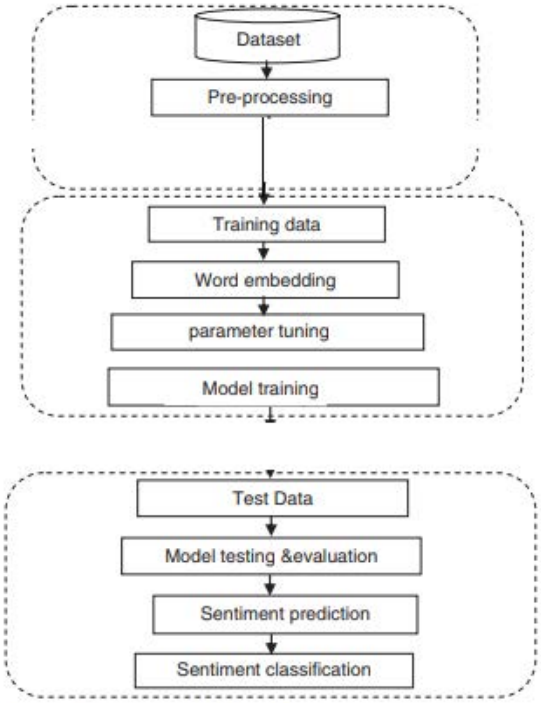

Figure 1: The flow of the proposed algorithm.

A. Preparing the data and Text Pre-Processing

Information accumulated from social it is all the more frequently uproarious and heterogeneous to organize media stages. We make the Twitter stream prepared for exploratory examination; the pre-handling step first changes the capitalized letters to bring down case, then, at that point, we retrieved all the tweets from social media and extract the standalone hashtags for further processing eliminates every one of the extraordinary characters, URLs, stop words, notices into minuscule pieces as separated hashtags that decidedly influence the information groups. Camel Cases has is been utilized over couple hashtags with respect of hashtags like "#StayHome," those are not difficult to change over into the portion. In any case, then again, some hashtags that include no camel case, e.g., "#stayhome," a tremendous jargon is expected to extract the hashtag and retrieve the longest

string objects as a text pre-processing added to that it utilizes a bunch of jargon of just about 70,000 English words to deal with these difficulties. Recognizing enlightening substance from an enormous and loud dataset, for example, tweets is a difficult errand. To accomplish this, the accompanying strategies are done inside the provided request to upgrade the text.

1. One well known method for breaking down COVID Sentiment information must be figure out word frequencies to see the value in the way routinely words are utilized in online opinion. Along these lines, the initial step is lemmatization that cycles with the utilization of a jargon and morphological examination of expressions and returns root words. We utilized lemmatization with the nltk technique that changes an expression over to its base structure, for instance, "passings" to "death" or "mindful" to "care").

2. The subsequent advance is to eliminate the stop words. It is the most appropriate strategy to beat the commotion from the text based tweets, (for example, "the," "a," "an," "in"). Stop words can be separated from the message to be handled, and it really does never again influence comprehension opinion strength over online media valence. Overall, as a pre-processing we have removed all the unnecessary words Which is called as stop words in NLP from the collected tweets like “the”, “off”,” and “

3. To eliminate the complexity our model perform the conversion of the case of the message and also comprehends the certified word into extraordinary word such as covid consider as coronavirus.our mechanism never alter the semantics of the word or sentences.

4. Constriction with the aid of other techniques to remove all the special symbols like punctuation question mark to enhance the quality of phrases in the tweets. These days, individuals spend their time on various social media like Fb,Twitter,whats app to express their opinion about any context like covid ,politics. Many individuals speak with one another; individuals for the most part utilize abbreviated structures and contractions of words in their text. We utilized the withdrawal planning technique that drops the vowels from the words. Expulsion of compression planning is connected with message normalization, and it is useful while working with Twitter information in opinion examination.

5. Twitter information is loud, which influences classification model enable to pre-process all the URL and dispose @client_mentions.Adittinally we also elimate all the alphanumeric characters and ASCII from our data repository for better opinion analysis on the grounds that they don't assist us with distinguishing feeling. We likewise supplant emoticons with their comparing response in text.

6. For hashtags, we kill the "#" image from the beginning of the expression. We utilized tokenizer to part hashtags into proper words, for instance, "#stayhomestaysafe," tokenizer changed over it into "remain," "home," "remain," "safe." Many words are linked at the end of the day, and we likewise performed word-division to accomplish this.

B. Feature Extraction

In our proposal we perform various operation like vectorization on the words, word embedding and also we deals with term frequency -inverse term frequency (TF-IDF) methods are utilized for include extraction. The count vectorizer include extraction procedure is utilized to change the retrieved opinion from the social media into multidimensional vector and enables those tweets in view of the most usually utilized words (count) that impacted over all the received social media opinion in the tweets. Word grid is form with the aid of vectorization of words where each remarkable word addresses the section of the network, and the chose message from the archive addresses the column of the

framework. Along these lines, we include the word in that specific text test. We additionally utilized the term frequency-inverse document frequency (TF-IDF) include extraction procedure alongside vectorization and its count. In our proposal ,term frequency and inverse term frequency is utilized for interrogate the social media opinion with weighted based implementation support to achieve the vectorization task. Followed by the entire process term frequency on the document is been compared with inverse term frequency in order to extract individual items in the record and prepared the total term frequency with the following characterized equation(i)

$$\mathrm{tf}\,(\mathrm{t},\mathrm{d}) = \frac{Frequency\ of\ term\ t, in\ document\ d}{Total\ number\ of\ terms\ in\ document\ d} \quad \text{(i)}$$

Where as in the above equation (i), TF t referred as number in report d and addressed with countt,d while the general number of terms in that archive is addressed by total countd. Inverse term frequency imagines that the document expansion over the keyword element t ie term will be highly utilized parameter educational for model preparation. Our inverse term frequency analysis may be characterized as in condition 2.

$$\mathrm{idf}\,(\mathrm{t}) = log\ \frac{Total\ number\ of\ documents}{Number\ of\ documents\ with\ term\ t\ in\ it} \quad \text{(ii)}$$

Whereas I" denotes the total number of documents retrived for the processing and DF" represent the amount expression t term is incorporated in the document. Whenever a term t regularly shows up in many archives, IDF processes the loads of an expression t low. At the moments stop words will have low in inverse term frequency ration amount the documents with respect to that inverse term frequency can be framed as following equation (iii)

$$tf\ idf\ (t, d, D) = tf\ (t, d)\ .\ idf\ (t, D) \quad \text{(iii)}$$

B. Machine learning and Deep Learning Model

Feeling examination or assessment mining is a field of study that breaks down individuals' perspectives, feelings, assessments, decisions, mentalities, and feelings towards item substances, authoritative administrations, people, issues, occasions, subjects, and qualities [15]. Feeling investigation is frequently alluded to as subjectivity examination, assessment mining, and evaluation extraction with a few connections connected with full of feeling registering, to be specific PC acknowledgment and enthusiastic articulation [16]. Different AI techniques can be utilized to order tweets in view of opinion extremity. The procedures utilized in this study are as per the following:

Logistic Regression

In this segment, we'll utilize the removed elements to foresee the opinion of a tweet. Calculated relapse is valuable for this as it utilizes a sigmoid capacity to yield a likelihood somewhere in the range of nothing and one. Review that in managed AI we have input

highlights X and a bunch of marks Y.In request to make forecasts, we want a capacity with boundaries θ to plan elements to yield names ^Y.To improve the planning of highlights to names, we limit the expense work by contrasting how close the result ^Y is to the genuine marks Y from the information. After this, the boundaries are refreshed and the cycle is rehashed until the expense work is limited to a palatable level. With strategic relapse, the capacity Fis equivalent to the sigmoid capacity. Specifically, the capacity use make forecasts in calculated relapse his the sigmoid capacity that relies upon boundaries θ and the elements vector xi, where I signifies the ith perception:

$$h(x^{(i)}, \theta) = \frac{1}{1 + e^{-\theta^T x^{(i)}}}$$

Finally the logistic regression notation utilized with the training the model alongside of weight space of vector θ.

Random Forest

One of the most used algorithms is random forest which has bunch of decision tree to perform the classification of the opinions. It is very like the choice tree however contains a huge number of choices in the branches and provide various classification results on the final target variable to provide the class and the class name is the mode worth of the classes anticipated by individual choice trees. This calculation is productive in dealing with huge datasets and large number of info factors without their erasure. Random forest purpose's greater part vote and returns the class mark with greatest votes by the individual choice trees. Social media document is handled as per the topic heading and enable the user model to perform the classification model, that document has two major element one is part of speech and the heads on the document.

what's more, document head with text [18]. The choice tree technique can be connected with a standard based framework. A few principles appear in the choice tree calculation while the preparation information document with final class based on the document terms is been. Performance analysis based on accuracy, precision are utilized to extract the best outcome of the model for the given sentiment analysis problem.

LSTM

Various solutions will be given using the latest techniques like deep learning, artificial neural network is implemented to achieved the sentiment classification from the baog of words to formulate the public opinion over the media. For that, it has used LSTM (Long-Short Term Memory) techniques as a combination of deep learning and neural networks. To address the problems in web mining challenges such as geo location and time of generated data can be maintained in a separate memory using LSTM techniques. The following figure 2 denotes the architecture of the LSTM

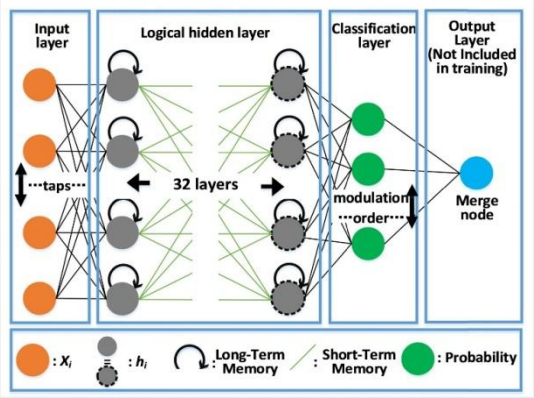

Figure 2: LSTM architecture

The above figure explain about the LSTM structure which provides four layers for data processing namely input, logical hidden, classification and the output layerThe input layer accepts all the series of data generated from various sources on a large network and it will be accessed by a logical hidden layer. This layer using separate logic to categorize the input data and it will be sending for preprocessing to remove the unwanted things. There are a total of 32 layers are working for this operation and the trained data set will be given to the classification layer. Again the classical classification techniques are used to find out the time of generated data with its location by deep learning concepts then the output will be given as output to the next layer. Finally, these trained network data has to be given as an input to the RNN system for data accessing purpose repeatedly.

Next level the classified data is taken as a trained input for the second step through a recurrent neural network. Deep learning concepts are used here for classification and it is running in the hidden layer. The time of generated input data has stored as a variable named t and these values will be given as an input for the next level procedures. So different data time intervals can be calculated from the log files and their validity also monitored. Finally, the location of the data which was generated from various sources around the world on the larger network than predicted output will be generated.

4. RESULTS

	UserName	ScreenName	Location	TweetAt	OriginalTweet	Sentiment
0	1	44953	NYC	02-03-2020	TRENDING: New Yorkers encounter empty supermar...	Extremely Negative
1	2	44954	Seattle, WA	02-03-2020	When I couldn't find hand sanitizer at Fred Me...	Positive
2	3	44955	NaN	02-03-2020	Find out how you can protect yourself and love...	Extremely Positive
3	4	44956	Chicagoland	02-03-2020	#Panic buying hits #NewYork City as anxious sh...	Negative
4	5	44957	Melbourne, Victoria	03-03-2020	#toiletpaper #dunnypaper #coronavirus #coronav...	Neutral

Figure 3 Covid-19 Dataset

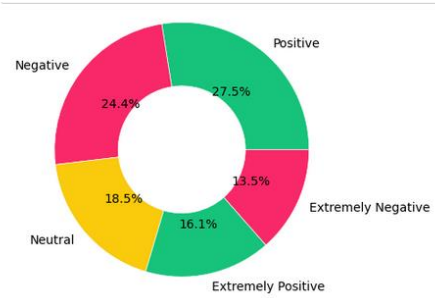

Figure 4 Proportion of tweets associated with each topic

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Accuracy score: 0.6300684570826751
Macro-f1 score:0.6416159377897189
Micro-f1 score:0.6300684570826751
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Figure 5 Accuracy of Logistic Regression model

5. CONCLUSION

Due to the pandemic situation though covid made everyone stay back in their home, working from home, and "isolation time," casual correspondence media has been broadly broadcast the news sentiments, sentiments, urging; regardless, an enormous part of the data by means of online amusement are unessential and don't have a spot with the certified circumstance. our research proposed a method for managing deal with the social media assessment using the COVID Sentiment opinion. We survey deep and machine learning with novel approach removing techniques that subsequently learn features in absence of human deterrent. We saw that people comply with government courses of action and Guideline Operating Procedures and began to lean toward shut down and implement social isolating in the year 2020 of march, but the solicitation by the public authority is in February 2020. There is a ton of trickiness by means of online diversion; in this manner, prosperity affiliations need to encourage a consistent system for perceiving Covid precisely to obstruct the spread of fake information. Our model gave the higher accuracy and precision among various machine learning techniques when diverged from similar

state of the art assessments. As further implementation we plan to take apart general feelings toward the importance or remarkable word fundamental points, like government reaction to the pandemic circumstance, medical care offices by government, disconnected assessment, and psychological well-being by utilizing DL calculations to expand their exhibition on the dataset. One constraint of this work is that it is explicit and doesn't check out at the disposition and feelings of individuals. Further work should be possible on the discovery of mind-set-based opinion examination.

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Android Application Development Using Kotlin Vs Other Languages

[1]**Sonal.J,** [2] **Srinidhi.R,** [3] **Shraddha.K.B,** [4] **Prof.Kanaiya V Kanzaria**

[1][2][4]*School Of Computer Science and Engineering,* [3] *School of Computing and Information Technology, Reva University*

Abstract

Over the past few years, mobile developers have had the opportunity to make use of new paradigms and tools for mobile application development. Android development has seen a spike in recent years. In 2017 Google announced Kotlin as an official Android application language and since then Android application developers have had the freedom to write Android applications using Kotlin, Java or any other languages such as C++, python, dart, etc…But to this day, Kotlin and Java remain the 2 most favourite languages for developers [24]. Kotlin is a programming language, which can be used together with Java as it combines object-oriented and functional features, Kotlin is interoperable with Java [25]. By the end of this paper, we will conclude which is the most suitable programming language for Android application development with the help of a comparative study.

Index Terms: Android, Kotlin, Java, JavaScript, Dart, Flutter.

1. INTRODUCTION

We have seen the rise in the use of mobile's day by day. Android is developed by Google and is an open-source mobile operating system. Kotlin is one of the most popular and famous programming languages used for Android Application development. Kotlin has proven to be a very effective language as it is more expressive and concise, i.e. you can express your ideas with ease and the number of lines of code will be less in Kotlin compared to other languages. Kotlin also helps users by eliminating common programming mistakes such as null pointer exception and it is interoperable with Java. Kotlin also has a structured concurrency. Android developers can easily code an android application with the help of Android Studio which helps in better functioning of our mobiles. Android studio is the IDE (Integrated Development Environment) which is available to build android applications for Google's Android Operating System and it is built on JetBrains' IntelliJ IDEA software. Kotlin was developed in 2010 and is open source. Android Developers received the option of building an android application in a new language in 2017 when google announced Kotlin as an official programming language for Android application development. Before the launch of Kotlin in 2017 developers used Java and C++ for some specific narratives. Java always remained the most popular programming language among developers but that changed after the launch of Kotlin in 2017. Though Java has been around for a long time and is being used by many developers it has minor setbacks when compared to Kotlin. Java was developed many years ago and hence has a lot of legacy baggage, as every new version of Java must be compatible with its previous version. But when compared, it's easier in Kotlin. Kotlin also has a few major advantages over Java which we will further look into in this paper. Google also announced that Android will be increasingly Kotlin-first. Kotlin-first means that all the new features and APIs will be provided in Kotlin first [1]. This led to further popularity of the language. Many types of research were conducted on how the developers were dealing with the adoption of this new language [2,3]. We will look into many more features, pros and cons of Kotlin in detail in this article.

2. LITERATURE REVIEW

In the comparative study: Prof. Matias Martinez and Bruno Góis Mateus et al.[2] have conducted a qualitative study on the reasons behind switching from Java code to Kotlin and have highlighted a few of the main reasons for the same, by gathering the relevant information from Android developers who switched from Java to Kotlin. A few of the reasons were: For accessing the features of the programming language (such as lambdas, extension functions, etc) which were not available in Java and to obtain safer code (That is to avoid null-pointer exceptions), to shorten the code length and make it easier, to lessen the redundancy, to make the syntax more clear and less Verbose. However, recently the developers of Java have been working with lambda expressions. In his paper, he also described a few drawbacks which were encountered by the developers during the initial state of development of Kotlin. Such as, compilation of Kotlin was slower, the APK size was increased. Now Kotlin has overcome the issue related to compilation and the Kotlin

codes can be compiled faster. In Kotlin there were no checked exceptions, problems with annotations and wildcard types and performance issues.NiketKeny [6] in his research paper discussed the development of android applications and has compared Kotlin and Java programming languages. He has also mentioned why most of the android developers opt for java code over Kotlin. He has also specified that because of the limitations of Java, it caused a problem with the design of Android API. In his survey, most developers felt that Java was simple and very easy to understand. Java being a verbose language requires writing code which can cause the risk of bugs/errors and requires a lot of memory. Victor Oliveira, Leopoldo Teixeira and Felipe Ebert et al. [3] have conducted the research using the concurrent triangulation strategy. They performed an in-depth analysis of all the questions and problems faced by the developers and to know how they deal with the recent adoption of Kotlin as an official language for Android App Development. Most of the developers said that the use of Kotlin can improve productivity, code quality and readability. Subham Bose, Aditi Kundu, Madhuleena Mukherjee, and Madhurima Banerjee et al. [11] have discussed where Kotlin can overpower Java and tried to brief out on which of the two languages is the best fit for the app development and which was most preferred by developers. In his paper he described the developers' point of view on why Kotlin would be preferred, because of the following reasons: safer code, it helps reduce bugs in the code, and makes Android development much easier.

ANDROID STUDIO: Android is an open-source operating system for mobiles. Android Studio is an IDE that helps in developing applications for an Android OS and is currently the most popular IDE to build an application with, with over 2 million applications being built for Android. Android studio was launched by Google on 16th May 2013 [7]. Android Studio offers developers the benefit of building an android application in any of the following languages they prefer: Java, Kotlin, C, C++, C#, Dart, JavaScript, TypeScript, etc.

KOTLIN: Kotlin being cross-platformed, can run on different platforms and is a general-purpose programming language with type inference and is completely interoperable with Java [6]. Due to type inference (where it can automatically detect the type of the expression) its syntax is more concise. It is a statically typed language where the type of variables is known during run time and its libraries depend on the Java class library.

Here are a few features of Kotlin.

Kotlin is interoperable with Java. Kotlin is 100% compatible with the ecosystem of Java frameworks, libraries and tools. A Kotlin code can call a Java code and vice versa. Applications using Kotlin can even run-on older devices with no trouble.

Kotlin codes are more concise. Kotlin has lesser number of lines of codes. One of the best features of Kotlin is that it is null safe and this helps in avoiding common mistakes for developers. In Kotlin the getters and setters get generated automatically which makes coding easier for developers.

JAVA: Java is an object-oriented programming language that was developed by Sun Microsystems in 1995. Java is one of the most favoured language by developers around the globe, especially for Android application development since it is easy to learn and is a brilliant choice for cross-platform apps. Android is built on Java and hence Java is one of the most preferred language. The beauty of the Java compiler (Javac) is that it converts the written source code to byte code which can be run on any platform. Java depends on a VM (Virtual Machine) to understand the bytecode. Android has its own virtual machine since every platform that runs java needs a virtual machine. The older version of this Virtual machine was called Dalvik which used JIT(Just In Time) compiler while the newer version of the virtual machine is known as ART (Android run time) which uses AOT(Ahead Of Time) compiler. The actual role of these Virtual machines is to convert the byte code into machine code for the execution of the program to take place. Java language has high security and is a dynamic language [4,5].

3. COMPARITIVE STUDY BEWTWEEN KOTLIN AND JAVA

EXTENSION FUNCTION: Kotlin has this special feature called as extension function where we can extend the class with new functionality and we do not need to create a new class for doing so. On the other hand, java does not have this special feature. In Java, if you need to extend the functionalities of a class you need to create another class and make use of the inheritance concept. You need to inherit the parent class (here parent class is the already existing class) to the newly created class [10] [11].

LESS CODE: Writing code in Kotlin is much easier and simpler compared to Java and Writing codes in Kotlin can cut off many lines of code (up to 40% to be precise) when compared to writing codes in Java [12]. Kotlin's syntax is much stronger compared to java. Due to smaller code, the developers understand the code with ease and the app can be developed much faster [13] [14].

CONSTRUCTORS: There are two types of constructors in Kotlin. One is the primary constructor and the other is the secondary constructor. The primary constructor should always be referred as the secondary constructor. The secondary keyword should be declared by the keyword 'constructor'. The role of this secondary constructor is to reduce the number of lines of code, which is absent in Java [11] [15].

CHECKED EXCEPTIONS: Checked exceptions are not there in Kotlin but is present in Java. We use the try and catch block to handle the runtime exceptions in Java which makes error handling in Java easy. Kotlin does not have checked exception. Throwable class is inherited by all the exception classes in Java. All the exceptions have a message, an optional cause and a stack trace [16]. The flow of the code or logic can be broken due to checked exceptions. It is still a debate whether checked exception is good or a non-checked exception is good [11] [10].

LAZY LOADING: Kotlin has a function named 'Lazy' which takes a higher-order function or a lambda as a parameter. It returns Lazy<T> as an object [17]. To prevent the unnecessary initialization of an object lazy loading is used. The initialization of the variables does not happen until you use the variable in the code [6]. This is basically done to reduce the wastage of memory. The variable is initialized only once, the next time you use the variable, you get the value from the cache memory. The advantage of this is that it is thread-safe. Initialization happens in the thread only for the first time. The second time we get the value from the cache memory. The variable initialized can be of type var or Val (i.e. they can be mutable or immutable) or nullable or non-nullable [18]. Java does not have this Lazy function.

NULL SAFETY: Null safety is a concept in Kotlin which does not exist in Java. Kotlin-type systems have an inbuilt null safety. Kotlin tries to avoid null values by default in order to avoid null pointer exceptions. Kotlin has a lot of Null safety operators some of them are as follows: Safe call operator (?)

Elvis (?:)

Not-null Assertion (!!)

Safe call with let (?let{..})

The benefit of being null safe is that it eliminates the risk of null reference from code [19].

MODEL CLASSES: To model the data in an application we can make use of the model class. In a model class, we can use the objects to receive or send data. Since Java uses encapsulation all of its properties are declared as private. Java uses getters and setters to access these properties along with a few String methods [20]. Kotlin has data classes for model classes, which have various inbuilt utility methods. The use of these data classes is to directly access the properties.

GLOBAL VARIABLES: Variables that have a global scope are called global variables these variables will be available throughout the program unless shadow them. Group of all the global variables together is called the global environment or the global set. In Java, global variables are declared inside a class with a keyword called static. Due to this, the java developers can access the global variables anywhere without initializing the class as an object. Whereas Kotlin does not use the static keyword instead it provides a companion object. You can implement new features such as extensions and interfacing with a companion object. But the use of static variables is always preferred because they are more reliable as they help keep the codes short and clean.

COMMUNITY SUPPORT: Kotlin is comparatively a new language and its community is much younger compared

to Java. The resources such as blogs, tutorials, videos, books, etc to learn Kotlin is very less as it is a new language. Java is easier to learn because of its resources and it's easier to ask for help because of its huge community [21].

DART: Dart is an object-oriented programming language founded by Lars Bak and Kasper Lund and developed in Google to build server and desktop applications. It is an open-source, class-based, general-purpose, garbage-collected language. Dart was first publicly announced by Google on October-12th 2011. It depends on the source to source compiler to JavaScript, to run in web browsers. Dart had the ability of high-performance implementation and was developed for modern app development. Just like Kotlin is interoperable with Java, Dart is interoperable with JavaScript. Flutter is a plugin that is a UI library that has a set of tools for developers, which helps dart in developing applications.

4. COMPARITIVE STUDY BETWEEN KOTLIN AND DART

TYPE SYSTEM: Both Kotlin and Dart are statically typed languages which means that the types are checked during compile time. Kotlin and dart have different syntax, to begin with for example in Kotlin a function needs to be denoted by 'fun' keyword followed by the name of the function which is then followed by '()" and then the code which is enclosed in a parenthesis '{}', while in dart there is no keyword to denote a function. In Dart, we directly specify the name of the function followed by '()' and then the code which is enclosed within a pair of parenthesis '{}'.

NULL SAFETY: We came across Kotlin's Null Safety feature previously in this paper. While Kotlin has Null safety, Dart has sound null safety. The main aim of null safety in Kotlin was to prevent Null pointer exception unless an explicit call to Null Pointer Exception is made or the '!!' operator is in the picture. The benefit of having Sound null safety is to help code run faster and enable more compiler optimization. Sound null safety results in small binaries, fast execution and few bugs.

PARTNER/CORE FRAME-WORKS: Kotlin's partner framework is Android while Dart's partner framework is Flutter. The basic architecture of Flutter is more UI-based than that of Android. The main aim of creating Kotlin was to make a platform more advanced than Java. There are data classes, sealed classes and null safety integrated into Kotlin to make it seamlessly interoperable with Java. Dart shares a lot of resembles with java and is a simple language. To make coding experience similar to mapping JSONs, Dart makes use of the dynamic keyword. Dart stands out from the league of both Java and Kotlin because of the feature called Async-wait [22][23].

TOOLS FOR DEVELOPEMNT: Both the languages have various useful tools. When writing an app on any IDE such as visual studio or IntelliJ, Kotlin is more convenient than Dart this is because Kotlin provides faster coding through features like post-fix completion. The feature of info popups in constructors that rely on field assignment syntax is not available in Dart. Also, the static analysis feature of Dart is a dubious concept [22].

POPULARITY OF THE LANGUAGES: The popularity of any language is based on how user-friendly it is. Google announcing that Kotlin will be the most preferred language for Android development caused the popularity of Kotlin to increase drastically. In India, Kotlin has become the most used language as of 2022. Dart's popularity is still less and is growing when compared to Kotlin [22].

5. FIELD SURVEY

We conducted a survey where we asked professional android app developers to give their perspectives on this narrative. We asked questions to which they answered based on their point of view which helped us greatly and this would enable us to find the best-fit language for android app development.

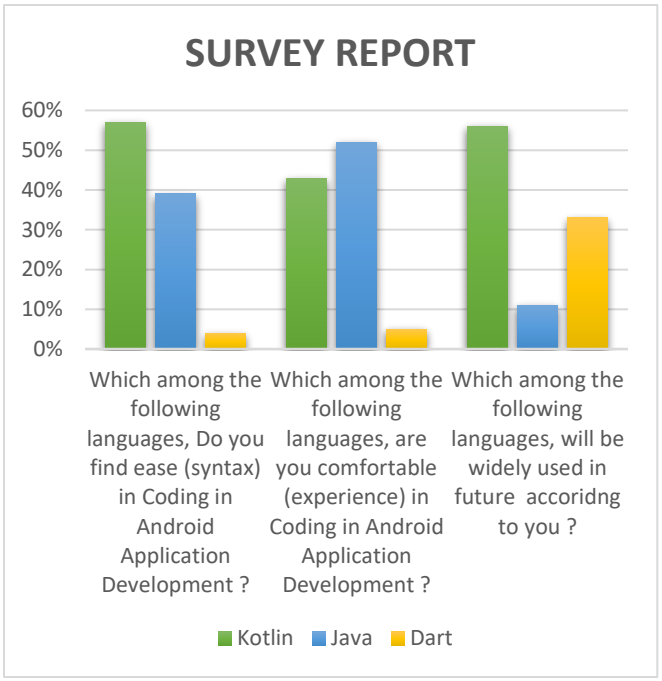

Figure 1: Bar graph showing the accuracy levels of languages.

RESULT: As per the field survey we conducted the results are in fig1. The first set of the bar graph shows that 57%, 39% and 4% accepted Kotlin, Java and Dart respectively for having said that, these languages are easy in terms of having easier syntax or the methodology they used for understanding the language hence a majority of the people find it easier to learn and code in Kotlin as compared to Java and Dart. The second set of the bar graph shows that 43%,52%and 5% chose Kotlin, Java and Dart as the most comfortable languages in terms of their experience when it comes to working with the language. Here Java is preferred in a higher number as Java is an old language and has a huge developers community and has many resources to develop the developers knowledge on Java. The third set of the bar graph shows that 56% chose Kotlin, 11% chose Java and 33% chose Dart as the future language. It is predicted that in future Kotlin and Dart might be the next popular languages used after Java as Kotlin is gaining popularity among developers and dart which must be used along with flutter is gaining popularity because it is multi-platform language. To answer the question on whether Java has or doesn't have a stand-in android application against Kotlin, one of the developers in our survey expressed his thoughts in the following words "Even though Kotlin is more popular and has an edge over Java, people would still prefer Java because over the past years Java is being widely used in most of the platforms. Thus switching over to Kotlin in all those platforms would take decades and thus Java would still be alive for years before Kotlin took over it."

6. CONCLUSION

Android development is one such domain which has not seen a downfall in the market and would not be seeing a downfall anywhere in the future. Kotlin looks like a promising future language and hence we took it upon us to research on this topic.

From the above comparative study, it is seen that Kotlin, Java and Dart have their own pros and cons. If your application is going to be less complex, easy to maintain and it needs to be developed quickly it's better to use Kotlin. With the help of Kotlin we not only can build android applications but we can also create web applications, native applications, server-side applications and desktop applications. Google has been using a lot of its resources to develop Kotlin. Companies like Netflix, Uber, Pinterest are using Kotlin [28].

But in case your application is complex and large it is better to use Java as it's easier to find Java developers and there are more resources to help with it. Java can be used in various sectors other that android application sector like financial

services, Big Data, Banking[26], Stock Market, Retail, Scientific and Research Community. There is a huge demand for java programmers who takes up the opportunity in the biggest brands of the world like Amazon, LinkedIn, eBay, Twitter, etc for building a solid infrastructure between their backend systems and their web application [27].

And if you want to create cross-platform apps or for client development, such as web applications, we can use the Dart programming language as a replacement for JavaScript. Dart along with flutter has a huge scope in the future due to its multi-platform nature.

The result of the recent survey which we conducted shows that many of the android application developers prefer Kotlin language the most, followed by Java, and then Dart in the current narrative.

Kotlin language overcomes most of the weak points of Java, like its memory usage, number of lines of codes and syntax. On the other hand, Kotlin overpowers Dart due to features like postfix completion.

Thus, we can conclude that there is no perfect language for Android development. It depends on the developer to choose which programming language is comfortable for them to work with based on their requirements.

7. ACKNOWLEDGEMENT

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REVUP

[1]Nazneen Kiresur, [2]Prathik N, [3]Peeyush Yadav, [4]Nithya Shakti R B, [5]Nikhil S Tengli

Authors affiliation, [1]nazneenkiresur@gmail.com,[2]prathik252416@gmail.com, [3]piyuankit@gmail.com, [4]jeevika75@gmail.com, [5]nikhil.tengli@reva.edu.in

Abstract

An event management system assists event organizers with event planning, execution, and reporting. Planning, organizing, and executing an event is a time-consuming task for any institution; therefore, with such systems in place, campus event planners will be able to book large-scale events, engage with service providers, and maintain a single source of record for repeatable, quantifiable events with the assistance of a comprehensive event solution. With an event of substantial magnitude, it is understandable that the infrastructure and development expenses for the same management systems would be prohibitively expensive. As a result, we seek to suggest an ideal solution for the challenge using a parallel-microservice-led architecture that aids in effective load balancing schemes and resource utilization. In addition, a large-scale notification system based on parallel computing is proposed in this study in order to provide quicker responses than traditional approaches. This would also effectively use the platform as a means for information exchange about such events and occasions.

Keywords. Event Management System (EMS), Microservices, Large-scale Notification Systems (LSNS)

1. INTRODUCTION

An event is entirely about individuals collaborating to design, operate, and engage in an experience. It is an activity that brings the target group together in space and time, a gathering where a message is transmitted, and actions take place. Numerous events are held in the modern world, including workshops, conferences, and fests[1]. An event involves organizers, participants, and a variety of other roles. Without a doubt, most organizations are devoting time and resources to developing effective strategies. The organizing procedure is time-consuming and involves a great deal of documentation. Apart from that, organizers are required to publicize their event using a banner and a social media platform. The most prevalent medium for sharing knowledge is social media, however, because organizers only communicate or publish information once or twice, it may not reach another student[1][2]. Organizers are passively posting events, which has a significant impact on program engagement. When the number of participants is large, managing the events without a proper system becomes quite difficult.

However, some systems focus on managing events, as well as issues in ensuring that organizers and attendees engage effectively. Certain systems are quite costly. In the current situation, existing systems have numerous flaws that render them ineffective in

carrying out events. Currently, all working systems are manual. As a result, there are numerous concerns about the process's security, validity, and feasibility. It's challenging to keep track of all events, clients, and services. Unmanaged planning might cause event execution to be delayed. Hence effective EMS is required to resolve this issue.

Our project is an online EMS, or more accurately, a gateway in the form of a website that will assist an event organizer as well as participants and stakeholders in the event's functionality. The following are some of the system's features: The system allows event organizers to log in and publish information about their events. This system has three major goals: assess and design a system for managing events, construct the EMS using a relational approach, and notify users about the event happenings through different mediums like mail, WhatsApp, etc.

The system's benefits include lower advertising costs, reduced paperwork, more efficiency and effectiveness, and fewer human errors. The system also provided an interface for maintaining all the reports of the events which help the organization during audits. It will undoubtedly assist organizers in digitally promoting events and exponentially increasing registrations and participation.

2. RELATED WORKS

Many architectures and designs have been proposed for EMS. This section enlists the efforts made in the prior:

1. The authors of [1] propose a generic academic event management platform capable of dynamically creating web pages for any academic event. A person could quickly create a website for his or her event by selecting certain options for the website, such as venue, registration, and call for papers, and populating the appropriate data.
2. The authors of [3] proposed a .NET framework-based architecture for the application's entire design. However, the application was limited in terms of advertising and showing pertinent information about upcoming events. The team's primary objective was to create a login-based EMS that would provide additional information on the participants.
3. The design presented in [4], in which the authors briefly discuss the many characteristics of the microservice architecture, and the architecture that has recently gained attention, in which big modules and components of system applications are broken down into simpler and more elaborate modules.
4. In [5], Amir Saleem and his colleagues proposed a system for event booking in which hotels and clubs can utilize a web-based application system. Additionally, the system can be used as a piece of software to promote all possible booking places. Rather than searching for materials throughout the site, the user may find them all in one location. This strategy was efficient and assisted the user in saving time and money.
5. The author and his colleagues present a study in [6] that examines a variety of companies and their techniques for managing large-scale events that occur on their premises. As a result, they developed and offered a mobile application allowing users to register for a range of events.

6. "Event optimizer" was proposed by Mr. Nagesh and his colleagues in [7]. There were numerous tightly coupled modules in use across the application, all of which serve a specific purpose in this proposal.
7. Rowstron and his teammates proposed a large-scale notification system-based infrastructure in [8], which was built on top of a generic peer-to-peer object location and routing substrate called Pastry. Scribe is capable of scaling to a high number of subscribers, publishers, and subjects while providing efficient application-level message multicasts.
8. In [9] they proposed a system with clearly defined roles and modules, each with distinct tasks and accessibilities across the proposed event management system. The module layout was well-supported in terms of institutional organization.

3. ARCHITECTURE DESIGN

As demonstrated by the history of software and system development over the last fifty years, software architecture is critical to software systems, providing plausible insights, eliciting the appropriate questions, and providing general tools for thought. Table 1. summarizes the existing software architectures.

Module Name	Description
Service Oriented	SOA is a business-IT-aligned approach in which applications rely on available services to facilitate business processes. A service is a self-contained reusable software component provided by a service provider and consumed by service requestors.
Distributed Computing	A distributed system is a collection of autonomous computing elements that appears to its users as a single coherent system.
Parallel Computation	Parallel computing is a type of computing architecture in which several processors simultaneously execute multiple, smaller calculations broken down from an overall larger, complex problem.
Microservices	Inspired By Service-Oriented, Microservices - also known as

	microservice architecture - is an architectural style that breaks systems and applications down to a more granular, modular level.

Table 1: Existing Architectures

A unique architecture based on existing approaches was developed to improve the performance of conventional load balancing schemes. The proposed design is intended to host computationally intensive operations as separate entities, hence boosting the response time of the server. Figure 1. illustrates a high-level explanation of the proposed software architecture.

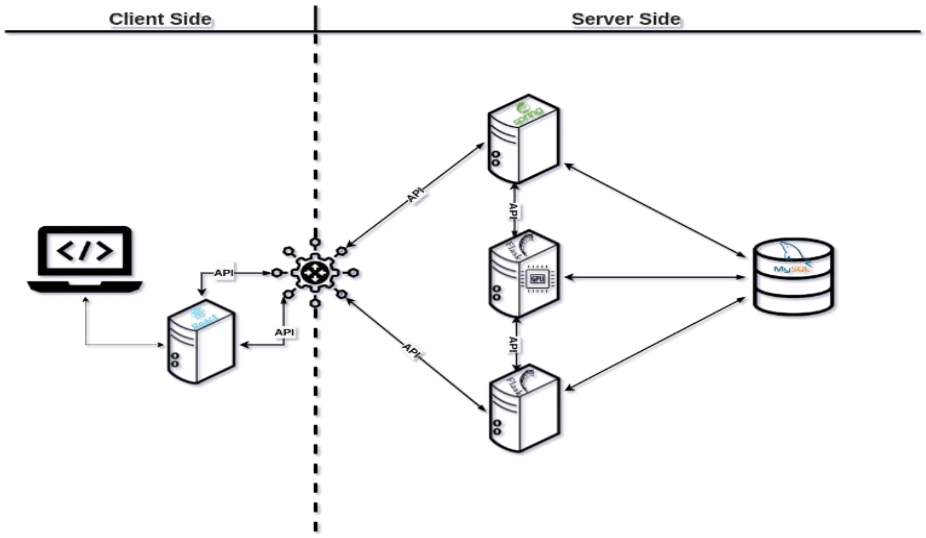

Figure 1: Proposed Architecture

The following are some of the most popular frameworks now available on the market, which are employed in this architecture:

1. Spring Boot: Spring Boot is used to create small, self-contained, ready-to-run applications, which may give your code greater flexibility and robustness. Spring Boot's numerous purpose-built capabilities simplify the process of designing and running microservices in production at scale[10].
2. Flask: Flask is a Python-based micro-web framework. It is characterized as a microframework due to the fact that it is not dependent on any specific tools or libraries [11].

3. MySQL: MySQL Database Service enables developers to quickly create and deploy safe applications using the open-source database[12].
4. React JS: React JS is a free and open-source JavaScript library for developing user interfaces for single-page applications. Since it's an open-source framework, it is wide open to various experimentations and resources that are available throughout the community[13]. React is also known to make the designs more dynamic and alive, and hence it was imbibed as the sole front-end framework for the proposed system
5. Apache Tomcat Server: This is an open-source Java servlet container that supports various Java Enterprise Specifications, such as Websites API, Java-Server Pages, etc.[14]. It is one of the most extensively used Java servers owing to various features such as high extensibility, a well-tested core engine, and a long-lasting design.

4. CONCEPTUAL DESIGN AND IMPLEMENTATION

Events of various types, from seminars to sports to conferences to cultural festivals can be handled and maintained by a generic EMS. Our research has led us to include the following requirements for our website:

1. User Access Privileges.
2. Event Report Management.
3. Large Scale Notification system

A. Conceptual Design

The proposed EMS's features are briefly summarized below:

1. User Access Privileges.

   Our application supports six distinct user roles which are anonymous user, user, Institutional user, organizer, admin, and super admin. Table 2. shows the breakdown of the different types of roles each user plays in our application.

USER ROLE	**DESCRIPTION**	**PRIVILEGES**
Anonymous User	All visitors to our website are regarded as anonymous users who must first register in our application to become a user/Institutional User.	View all events Register for the application.

User	Users of the application include all registered users who are not affiliated with the institutions.	Sign In. View all events. Register for events. Raise queries.
Institutional User	Institutional Users of the application include all registered users who are affiliated with the institutions.	Sign In. View all events. Register for events. Raise queries. Apply for Organizer.
Organizers	The organizers of the application may be students, faculty, or staff members responsible for organizing the events at the institution.	Sign In. View and register for events. Create and manage events. Create and manage event reports. Raise queries. Apply for Admin.
Admin	Every department in institutions will have an admin who will be in charge of monitoring all the activities regarding the events in the department.	Sign In. View and register for events. Create and manage events. Create and manage event reports of the entire department. Create and manage event types. Create and manage Organizers. Create and manage queries.

Super Admin	There will be only one super admin in the institution who is responsible for monitoring the entire application.	Sign In. Manage all event reports. Create and manage event types. Create and manage departments. Create and manage Admins.

Table 2: Types of User Role in the Application

2. Event Report Management:

Event reports are the documents that support the insights gathered from the events which are to be curated from time to time during or after the completion of the events. Our web application support uploading the downloading the event reports. This is limited to the respective authorities which are essentially the Organizer, or the admin associated with the event. The reports then can be downloaded by the same user. Admins, however, have special privileges that allow them to see the events where reports have been uploaded directly, a case not provided to the organizers.

3. LSNS:

Notifications are alerts that are used to notify users about the updates that are of concern to them. A publish-subscribe model has become the fore parameter for distributed systems over time[8]. In our architecture, we proposed a parallel computed, large-scale notification system, which not only adheres to making use of the resources efficiently but also makes the entire notification aspect of the EMS faster as compared to the traditional practices of circulating notices through the same medium.

B. Implementation

RevUp is a web-based event management application that allows institutions to plan and manage events. All our application servers are hosted on the Apache Tomcat server. React Js was used as the sole front-end framework. This was done to ensure we have a user-friendly, feature-rich, and lightweight user interface. MySQL was used to interact and handle the entire application's data, right from user sign-in to handling and changing of user roles amongst the institution. It is also used for storing the event data and all its related data as well.

The backend servers consisted of 3 modules which were built using Spring Boot and Flask. The first model completely dealt with all the event-related information like event details, department details, event reports, and event classification which was completely built using spring boot which delivers a high level of security using secure authentication. The second module was developed using a flask that mainly dealt with user-related information

which required a higher level of security compared to events. So, we incorporated key encryptions to authenticate the user which prevents threats like SQL Injection protection, and guards against XSS (Cross-Site Scripting) attacks, etc. As for the LSNS, as this required proper load balancing and efficient utilization of the resources, this final module was developed over Flask, owing to the fact that it is a lightweight WSGI framework[15] and it supports a varied array of Python modules to support multithreading.

One of the benefits of this application is that it requires no prior training to operate and can be used to create and maintain both technical and non-technical events.

C. *System Workflow*

The proposed system of the platform is as follows:

1) *Handling User Privileges:* Like in any organization, the platform allows the users to have distinct roles and responsibilities. These can be assigned to the users only if the higher role accepts the requests of the candidates. The system maintains the hierarchy in such a manner that an institutional user can only become an organizer and thus this request can only be verified by the said peer, the admin. Similarly, the organizer and admin can be reviewed by their respective peers. Figure 2 depicts a scenario, where an organizer has requested to be promoted to *Admin*. The same will come into action once Admin approve his/her request.

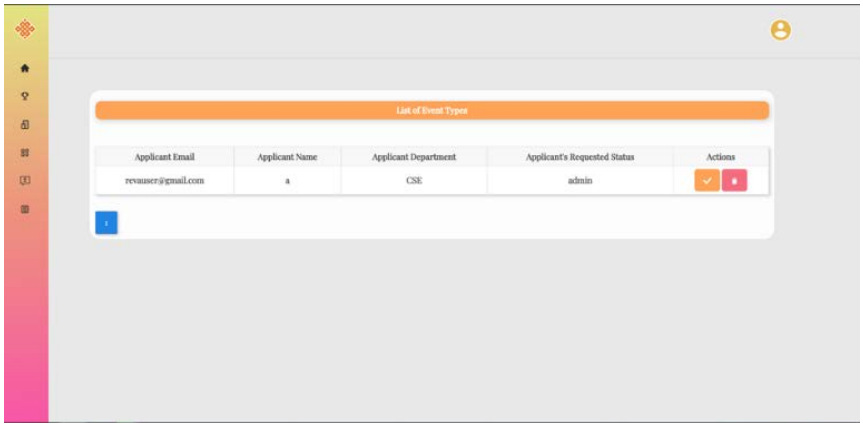

Figure 2: Admin approving requests for organizers

2) *Creation of a New Event:* The creation of an event is limited to only the organizers and admins of the department. To do this, the event creator needs to fill-up the form (shown in Figure 3.) and enter the details that prevail regarding the event. This also includes uploading an event poster which would

be used throughout the platform. Once created the event created gets enlisted on the dashboard where the other users can also view the same from the same point of time.

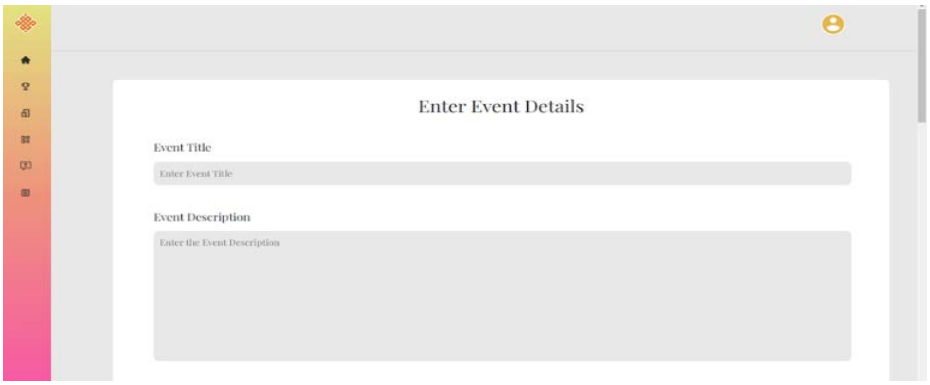

Figure 3: Form for creation of a new Event

3) *Data Updating and Manipulation:* Updating or manipulation of the present data associated with an event can be edited by its creator or the admin of the corresponding handling department of the organization. The user gets the present data in the respective fields which aids them to make the modifications easily. The view also allows uploading and downloading of the event reports provided the event has been completed (shown in Figure 4).

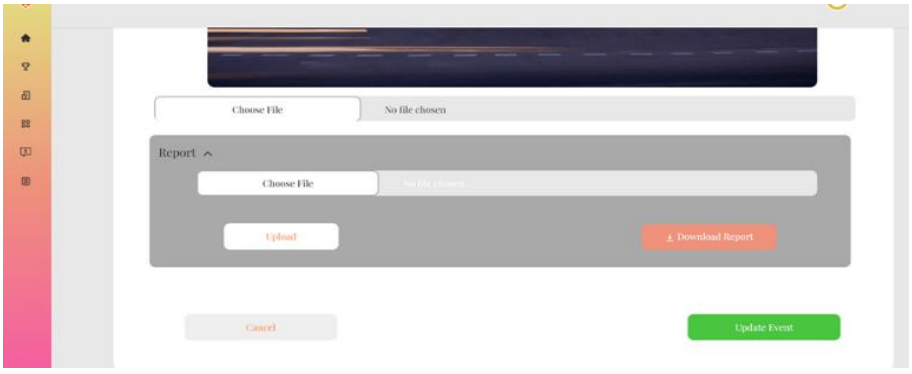

Figure 4: Update Event Details along with privileges to upload and download report

4) *User Views:* Based on the user roles, views have been assigned to each role wherein the User and Institutional user roles have the read-only view for the events. As for the Organizer and Admin, they have been provided with the option to edit or upload the events that they oversee. As for the super admin, the privileges are only to maintain the user privileges and the institutional data regarding the departments, or the requests made by different users in the institute. Figure 5 shows the Home Page (*Event Page)* which is prescribed only for Anonymous users. The sidebars and other functionalities get changed based on the different user roles that are defined.

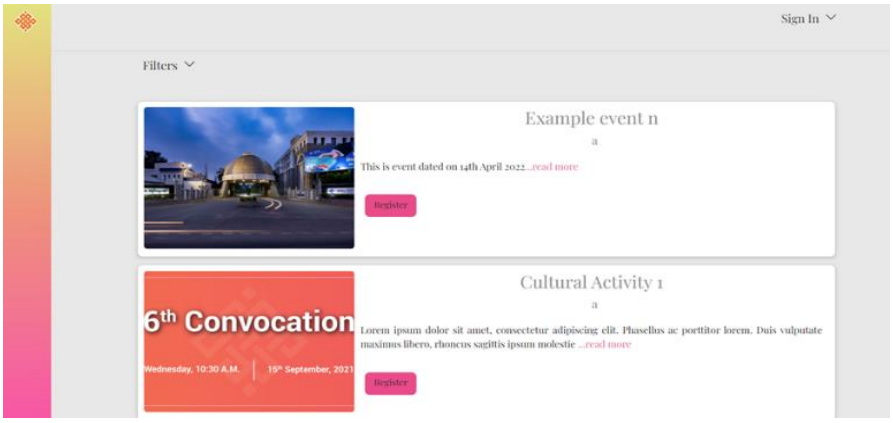

Figure 5: Event Page loaded for an Anonymous user

5) *Privileges:* Privileges have been assigned throughout different user roles that are allotted during the signup. This can be elaborated as
   a) Anonymous User: The user can only view the events that are currently "active" or whose registration deadline has not been passed yet. This is to only lead the user to either Signup or Sign-In to the platform.
   b) User: The role of the user is for an event that is open to all candidates, regardless of their association with the hosting organization. The users can register for such events and thus can participate.
   c) Institutional User: These are the types of users that are students or members of the institution other than the Organizer or the Admins roles. Such users can register as well as request to be promoted to the user role of Organizer provided, they are entrusted with the responsibilities, and the application for the same is approved by their peers.
   d) Organizer: Organizers or the members of the platform who have been assigned to host or handle the events associated with their departments. They can create or update the events and thus can also upload and view the reports of the same.

e) Admin: Admins are the users that manage the platform when it comes to their department. They can handle the creation and updating of events. Admins also have the privilege to create or update the Event Type or the category to which the event belongs. This category comes in handy whilst creating or updating the events. Admins can also view and download the report for the events completed in their department. Finally, they also have the privilege to approve the requests of the Institutional Users or the Organizer to be promoted to the requested roles.

f) Super Admin: This user overlooks the creation and management of the User Privileges. They are not to create events but can have all other privileges that other admins may not have. They can create or modify the details regarding the department or the event categories. Departments are only to be viewed by other event creators (Organizer and admin) wherein during any creation or updating, the same is taken from the user details itself.

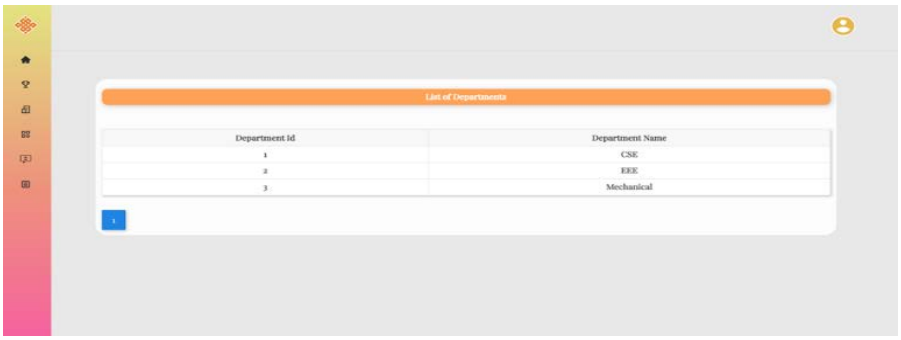

Figure 6: List of Available Departments

5. EXPERIMENTAL RESULTS

Numerous experiments and plannings were conducted in order to execute the proposed architecture over the web application. These addressed a variety of topics, including testing and confirming the accesses permitted to each user role and the way these roles' requests are handled. The platform was distributed to various users on the premises in order to obtain feedback and approvals on the platform's functionality. This aided in the implementation and testing of our project's needs, as well as in broadening the platform's usefulness. With regards to the Large-scale notification system, we experimented with traditional means of alerting people through WhatsApp and email, but the audience pool can be very enormous (as little as 10,000 individuals), and in such circumstances, distributing alerts in a timely manner was not possible. Thus, after doing further experiments with the multithreading strategy, we saw a significant improvement in notification delivery time for the audience size that we had available. The experimental findings from evaluating the server response time for a test size of 10,000 test user emails in the large-scale notification system are summarized in Table 3. The y-axis indicates the

response time (in seconds), while the x-axis indicates the computing methodology utilized to distribute the emails during the test runs.

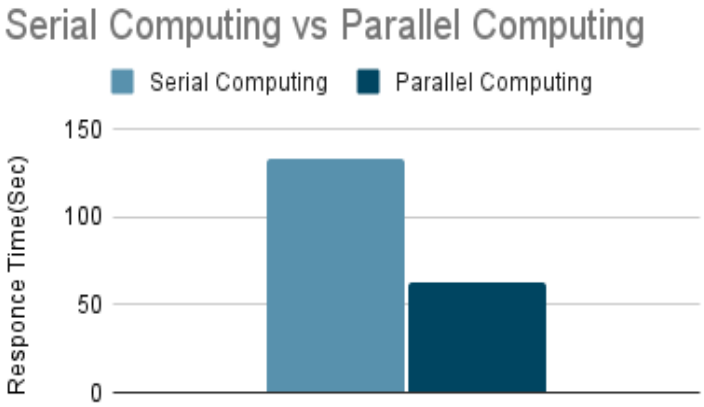

Table 3:Performance analysis for Serial vs Parallel Computing in delivering large scale notifications.

6. CONCLUSION

Our goal was to minimize human effort and make event planning easier for users, administrators, and event organizers. We sought to create an EMS that could be used to manage any type of event effectively and efficiently for any organization. This approach is now applicable to a variety of events, including conferences, seminars, cultural functions, and festivals. Our long-term objective is to incorporate a machine learning model that will provide event organizers with enhanced insights into how to increase event registrations. However, there are some drawbacks, such as the fact that user registration has not yet been implemented. However, registration will be implemented in the future, as well as an expansion of the spaces available for the creation of various types of events.

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DESIGN AND DEVELOPMENT OF AGRICULBOT

Prof. Ravishankar. D

Prof. School o ECE

REVA University Bangalore, India

ravishankard@reva.edu.in

A Jeevitha Shree

School of ECE REVA University Bangalore, India

jeevithagangatkar@gmail.com

Abhishek Damodaran

School of ECE REVA University Bangalore, India

abhishekkviisc@gmail.com

Santosh Kumar H

School of ECE REVA University Bangalore, India

santoshkh118@gmail.com

Mohith S Reddy

School of ECE REVA University Bangalore, India

mohithsreddy111@gmail.com

Abstract.

Agriculture is the origin of human sustenance. Almost 42% of the total population of the world choose agriculture as an occupation and almost 60% of India's population also choose this as a major occupation. Agriculture is the process of cultivation of plants for providing necessary nutritious products for human livelihood. As per the recent analysis, we observe that farmers even now follow traditional methods for better production but with increasing population meeting, the demand is being very difficult. And farmers face enormous challenges such as plant diseases, weeds infestation, and pests. Here in our project, we are considering the weed as a major aspect of controlling we are finding out the best technique. In the olden days, weed detection was done by inspecting each corner of an agricultural field and was manually removed with bare hands. Later with the improvement in technology, people started using herbicides to take out the weeds which were causing drastic changes in the environment causing Green Revolution which was a major cause for effect in the environment. Later, few methods came to find the weeds without human intervention, but because of lack of accuracy, they were incapable of achieving for the public. So, weed control is important, as failure to adequately control weeds leads to reduced yields and product quality. Hence, weeds should be identified and classified properly so here we are implementing a few methods in our project to reduce the usage of herbicides and use the spraying technique only in areas where the weed is present and remove them permanently. The robot which is designed for agricultural needs is named Agricul-Bot such that without human intervention the weed is identified and does the necessary operations. To accomplish this project, we are using an image processing technique using python.

Keywords. Agriculture, Image Processing, Weed Detection, CNN Algorithm, Spraying, Cutter.Introduction

I. INTRODUCTION

Agriculture is a key element in the existence of human life. The rapid growth of the global population is putting up immense pressure on the agriculture sector for better quality and quantity of food production. As per the prediction that the global population would reach 9 billion by 2050, food production must be doubled with increasing demands, but agricultural lands face enormous challenges such as plant diseases, pests, and weed infestation.

This would reduce the quality and yield of food that are poisonous, and produce thorns that harm the crops. To reduce these challenges faced by agricultural lands, the management of the weed will make farmers spend billions of dollars without sufficient help, which results in less weed control and crop production. Thus, weed control is a major aspect that leads to reduced yield and quality. The main aim of Agricul-bot is to use robotic technologies within the field to detect the weed and manually spray only in that area. In the olden days, weed detection was done by employing some men who used to inspect every sector and remove them manually using their hands. Later with the advancement in technology they started using herbicides to get rid of the weeds. Later there came a few methods to detect the weeds automatically but due to lack of their accuracy, they didn't reach the public. So, they started using the image processing technique for this purpose which aim of our project. We will provide inputs of the field to an agricul-bot this will detect only the weeds and spray on them. To get the accurate weed image, we have to insert the good clearance picture as input. Taking a photograph may be done by attaching a camera to a tractor or taking them manually. Then we are going to apply the image processing technique using python for weed detection. The objective of this project is that weeds are the unwanted thing in agricultural lands which is consuming all the nutrients, water, land, and many more things that have to go for crops which results in less production of the required crop. The farmer often uses pesticides to remove weeds which is also effective but some pesticides may stick with the crop and may cause problems for humans

II. RELATED WORKS

The review of the proposed system is been addressed in this section.

[1]. Leaf Diagnostics, can be found using a variety of technological microscopic detection approaches and can be categorized into the analysis tool and application type. This is a highlight of paper issues and leaf diagnostic challenges. The growth of the world depends on the better quality and quantity of production of yield. Production can be improved by diagnosing leaf disease.

[2]. Autonomous robot for agriculture is to conduct various agricultural activities such as seed, herb, spray, fertilizers, and pesticides. Arctobot 2570 microcontroller is controlled by the Arduino Mega Port. The powerful Arduino mini system is used to control and monitor robot jobs. If a seed is planted at a suitable spacing and depth, it allows a sensory sequence to know the robot.

[3]. The IoT-based solar-powered acrylic paper uses three suppliers, design and development irrigation services, and automatic and remote agricultural surveillance. Solar power is harvested when irrigation is done. When implementing the irrigation project, it

moves in a predetermined path of a farm, and the soil moisture and moisture feel. Two major issues in modern agriculture are water shortages and high labor costs, these issues are agricultural desktop automation.

[4]. A robot is designed for agricultural purposes. The speed and accuracy of work are designed to reduce the workload of the farmers. The proposed system aims to design a multi-purpose autonomous agricultural robot vehicle that is controlled by IoT for sowing and spraying pesticides. These robots are used to reduce human intervention, ensuring higher yields and capabilities use resources.

[5]. The use of machines in precise agriculture has increased investment and research using robotics applications in mechanical design and job management. To carry out the agricultural activities in a better way, the check of the functionalities of the machinery is very important. It encourages agricultural robots.

[6]. In this paper, navigation problems with wheel motor robots (WMRs) are reviewed, WMR's navigation technique is extensively analyzed, and there are ways to solve problems such as robot navigation, spread, and route planning. The advantages and disadvantages of summarizing and existing methods. This document is a solution to the solution of WMRs in a complex and intricate purpose of agriculture.

[7]. The parallel sites can be useful in situations where the precise motion requires a particular place, in system configuration, low recession, high element, and accuracy. This article mainly focuses on a 4-PPPR robot handler with three General DOF and a circular DOF, in the ridge content of strawberries. A software simulation is implemented to prove that this movement can meet all the movement requirements by driving four operational movements allocated in the system.

[8]. The design of agricultural robots, which are inspired by agriculture, is designed. AGRIFA is an automobile driver and a farmer who continues to pursue automated agricultural work. It will replace farmers working in a dangerous and harmful environment. Intelligence design concept, process design, and control system design are described in this paper.

III. OBJECTIVE

Weed is an unwanted thing in agriculture. Weed uses the nutrients, water, land, and many more things that must have been used by the crops.

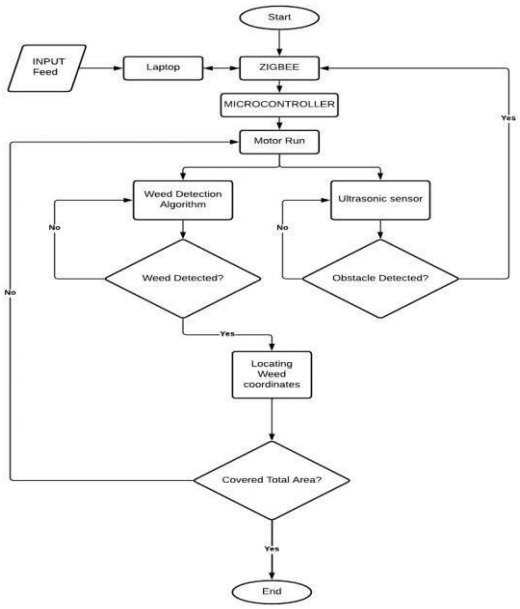
Which results in less production of the required crop. The farmer often uses pesticides to remove weeds but some pesticides may stick with the crop and may cause problems for the human. Hence these weeds should be identified and classified. So, categorizing the weed in the agricultural lands will be very helpful for better production of yield.

IV. PROPOSED FRAMEWORK

Fig 1: Flow Chart of Agricul-Bot

A connection is established between the robot and the laptop through the microcontroller with the help of ZIGBEE. Once we provide the input feed to the laptop, the robot starts running, and the software starts to identify the weed present in the input feed. If the weed is

detected, the robot slows down and the spraying mechanism is implemented by collecting



the coordinates of the weed. If the weed is not detected, then the robot continues to move. This process happens until the entire area is covered or until the input feed ends. Simultaneously the ultrasonic sensor mounted onto the robot will keep on monitoring the obstacles which come in its way and notify the user. The working of the Agricul-bot can be explained with the help of the block diagram shown below.

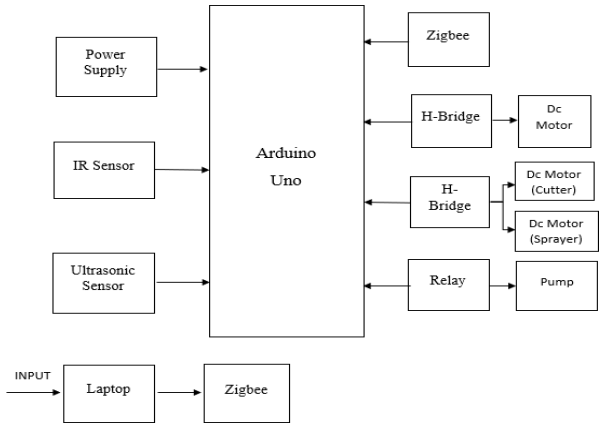


Fig 2: Block Diagram of Agricul-Bot

The working of Agricul-bot can be controlled using a microcontroller or an Arduino. Here we use the Arduino for controlling the functionalities of the robot. The power supply given

to the Arduino can be direct or can be given through a battery. The direct supply given to the Arduino is 230V AC, which needs to be converted to 12V DC. This conversion can be done using an adaptor that has an inbuilt transformer, rectifier, filter, regulator, and load. This is exhibited in Fig 3

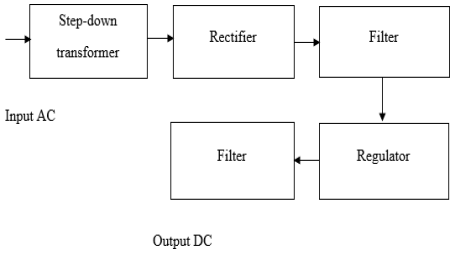


Fig 3: Block Diagram of Power Conversion

A transformer is used to decrease the output voltage. There are two types of transformers: Step- up transformer as well as Step- down transformer. Here we need to decrease the output voltage so, we use a step-down transformer. In a step-down transformer, primary windings are greater than secondary windings. The output of the transformer will be 12VAC. This 12V AC is given as input to the rectifier. The rectifier converts Alternating Current to Direct Current. There are two main types of rectifiers, they are Half-wave as well as Full-wave rectifiers. The full-wave rectifier is again divided into a Bridge rectifier and a Center-tapped rectifier. A bridge rectifier consists of 4 diodes whereas a center-tapped rectifier consists of 2 diodes in which one is used for the forward direction and the other for the reverse direction. The output of the rectifier is 12V DC. Even though we get 12V DC, there will be some sort of distortion or noise present in the signal. Hence to remove this noise we use filters. There are 3 types of filters, they are Low pass filter, High pass filter, and Bandpass filter. The output of this filter circuit will be a 12V DC signal free from noise. This noise-free 12V DC signal is sent to the Arduino for performing the required functionalities. Instead of this supply, we can directly connect a 12V battery. A moisture sensor is used to sense the water content of the soil. This moisture sensor works on the analog output equivalent, the moisture content in the soil is inversely proportional to the analog output equivalent. When the analog output equivalent is low it indicates that moisture content is high and when the analog output equivalent is high, it indicates that the moisture content is low. Depending on the moisture content, the pump is turned on or off. Relay is used as a switch to turn on or off the pumps used for water sprinkling and spraying of weedicide. This robot's movement and functionalities can be controlled either manually or automatically. Manual control is achieved by giving the required functionalities as commands to the robot as input through a cable wire connected to Arduino or through wireless communication like Zigbee. Automatic control is achieved when the robot is made to work all the functions one after the other by programming some amount of delay in between them.

I. IMPLEMENTATION

V.I. SOFTWARE DESIGN

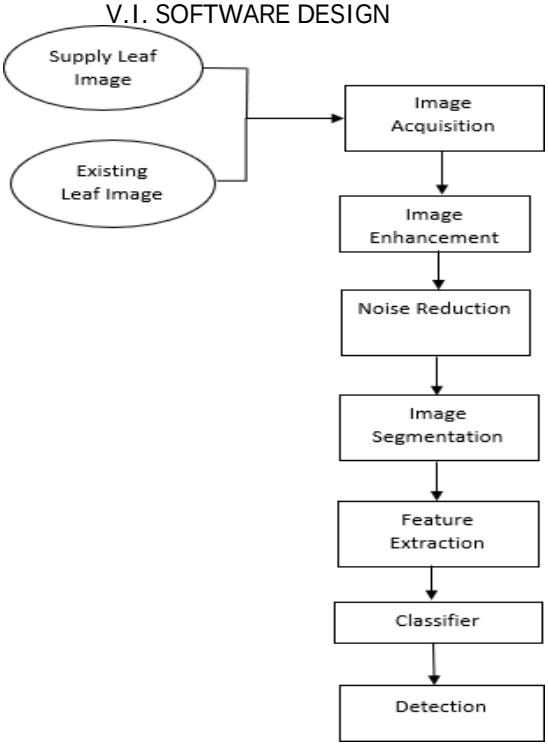


Fig 4: Software Flow

Image Acquisition Process: At first fresh crops and weeds are handled. The dataset comprising this fresh crop and weeds is known as the preparation dataset. When the preparation dataset is handled then the added or provided leaf picture is the test weed picture. Further picture investigation is accomplished for a progressively appropriate presentation; the picture improvement process is connected.

The Image Enhancement: This task is used to enhance the input image for the further process which helps to carry the process of image analysis for a more suitable display. The image enhancement method used in the project is the contrast stretching and slicing technique and further, many more techniques can be used.

Noise Reduction Process: The noise could be introduced amid the procedure of picture securing or the electronic transmission of the pictures. The noise reduction systems are utilized to evacuate the undesirable noise of the leaves' pictures. Further, the procedure is made basic and simpler by sectioning the noise-free leaves pictures.

Image Segmentation Process: In the picture, the segmentation process leaves pictures that are separated into sub-pictures or a set of pixels or small multiple segments. The elements of the subdivision of the picture rely upon the problem picture and segmentation is ceased when the desirable or region of interest of the picture gets separated, in this way the segmentation dimensions are taken into consideration.

Feature Extraction Process: Next the segmented images are given for feature extraction. This process helps to reduce the image data by mainly focusing on features of interest and removing other features. This is done by measuring particular features such as entropy of the weed, energy, mean, size and texture, etc.

Classifier Process: These extracted features from the weed images are used as input to a classifier, which classifies weed images. The classifier we are using here is the CNN classifier; this classifier is used only if we have two classes. So, here we are going to consider one class as the database of leaves images and the other as the input image data set.

Texture Feature Extraction: Gray Level Co-occurrence Matrix (GLCM) helps in analyzing the surface of the weed image. This characteristic is used for abstracting the texture of the weed detected. The conflict of the pixel with its neighbors is determined in the majority of the image and with a variation of the pixel to find the difference between the local pixel.

Histogram Equalization: To get better quality information from the image it is necessary to calculate the histogram equalization of the image. The process of changing the intensity value or adjusting the intensity value can be done using this process. This process is about intensity values transformation so that the particular histogram is approximately matched to the histogram of the output image. The histogram equalization function is histeq

V.II. HARDWARE DESIGN

The experimental setup of our project consists of a frame in which the battery is mounted and a solar panel is placed upon the frame. Also, the cuter blades are present in the front of the machine which is operated by a motor1. The power from the battery is transferred to the DC motor. Also, the frame consists of a wheel and which is used to guide the vehicle in the desired path as per the wish of the operator. The battery is charged by the solar panel continuously during the daytime. When the machine is switched on, the battery supplies power to the motor which operates the cutter blades. And also, the machine is provided with a tank that is connected to the sprayer and is used to spray the water or the fertilizer that is stored in the tank automatically from left to right. The main objective is to achieve more profit and make the manpower consumption level low in the Agricultural field. In the current situation, the agricultural sector is one of the main things to be developed and it's very important and useful to our mankind. Our idea is to save the time and energy wasted on repetitive farming tasks. Importing this machinery into the Agricultural sector is quite helpful. The working of the current model is based on the field Parameters. The design of this product can be used for various tasks such as spraying, sprinkling, and cutting. The solar panel consists of a Photovoltaic (PV) cell, that absorbs the sunlight to generate the power which is used to run the vehicle. The battery can also be recharged through regular electricity. The main objective of this design:

- ECO friendly (Because we are using solar power and charged battery for operation)
- Easy of construction
- More economical.
- Its works on the renewable energy source.
- It does not create air pollution & noise.

- Easy to handle.

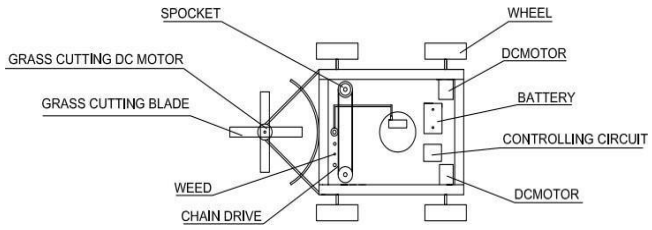


Fig 5: Experimental Setup of Agricul-Bot

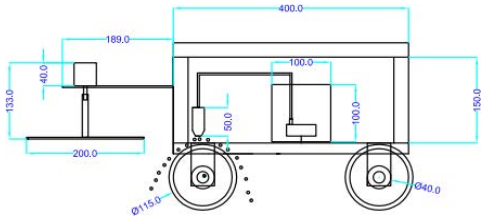


Fig 6: Design of Agricul-bot

Sl. No	COMPONENTS	QUANTITY	PRICE
1.	Solar Panel (32cells, 10W,12V)	1	1200
2.	Battery (1.3ah, 12V)	1	600
3.	DC Motor (20W, 12V)	6	2400
4.	Blades (3000rpm)	2	300
5.	Wheels (1.5inches,100mm)	4	900
6.	Storage Tank (2.5L)	1	100
7.	Relay (12V)	1	26
8.	Arduino AtMega-328p	1	975
9.	ZigBee 802.15.4	1	3000
10	HC-SR04	1	175
11	H Bridge L293D	2	135
12	Pump	1	500
13	Sprayer nozzle	1	300

14	Shield	1	500
15	Sprocket and chainset	1	1500
16	MS rods (framework)	--	3000

Table1: Price and Quantity of Components of Agricul-bot

VI. RESULTS AND DISCUSSION

The proposed work is trained by the excellence dataset and compared with the given test/input images. Hence, we define the method for gauging as follows:

PREDICTED

ACTUAL

	Class Crop	Class Weed	All Classes	Total Actual	Precision of each class= Correctly Predicted/ Total Predicted	Recall of each class= Correctly classified/ Total Predicted
Class Crop	0.86	0.03	0.74	1.63	0.86/1.01= 0.85	0.86/1.63=0.52
Class Weed	0.02	0.87	0.26	1.15	0.87/1=0.87	0.87/1.15=0.74
All Classes	0.13	0.10	0	0.23	0/1=0	0/0.23=0
Total Actual	1.01	1	1	Total=3.01	Average Precision=0.79	Average Recall= 0.75

Average Precision= (Actual of class crop * Precision of class crop) + (Actual of Class Weed * Precision of Class Weed) + (Actual of All Classes * Precision of All Classes)

$$\text{Average Precision} = \frac{(1.63*0.85)}{3.01} + \frac{(1.15*0.87)}{3.01} + \frac{(0.23*0)}{3.01} = 0.79$$

Average Recall= (Actual of class crop * Recall of class crop) + (Actual of Class Weed * Recall of Class Weed) + (Actual of All Classes * Recall of All Classes)

$$\text{Average Recall} = \frac{(1.01*0.52)}{3.01} + \frac{(1*0.74)}{3.01} + \frac{(1*0)}{3.01} = 0.75$$

$$\text{F1 curve} = \frac{2*(\text{Precision}*\text{Recall})}{(\text{Precision}+\text{Recall})} = \frac{2*(0.79*0.75)}{(0.79+0.75)} = 0.769$$

Table2: Experimental Calculations

The precision vs recall, F1 score, and confusion matrix results are given in the following figures as shown.

Fig 7: Precision vs Recall curve

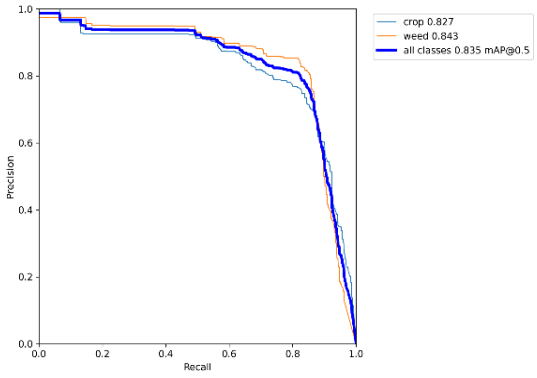
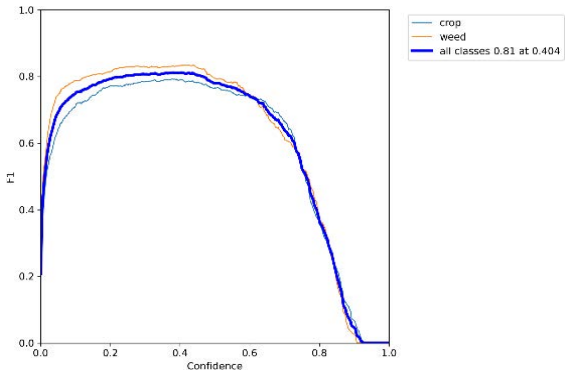


Fig 8: F1 score curve



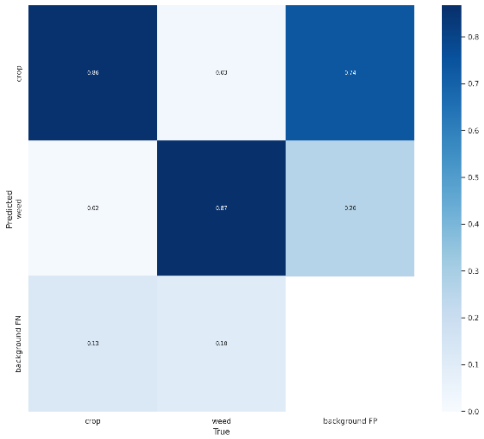


Fig 9: Confusion matrix

The following are labeled and predicted images are shown below

(a) Labeled images

(b)Predicted images

Fig 10: Truth and predicted images

A-frame is used as a base for connecting and assembling everything in the agricultural robot, it consists of six motors in which four gear motors and two motors for the sprayer and cutter. The robot encompasses the following functions:

1. Weed Detection
2. Spraying
3. Cutting

These functions are done using different modes. Programming for different modes is done using different loops and functions. Normally weeds, as well as healthy plant pictures, have dissimilar structures. Generally, a healthy plant will not have abrasion but weeds will have abrasion, thus the complex can acknowledge the design, in this way system recognizes the differences between healthy plants and weeds.

(a) Front View (b) Side View

Fig 11: Sprayer robot after assembly

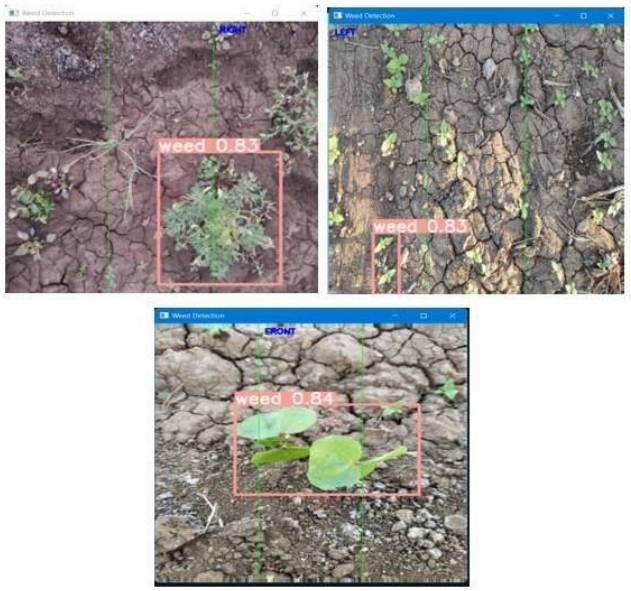


Fig 12: Simulation Results

VII. CONCLUSION

As agriculture has been chosen as the fundamental occupation, it is necessary to have an alternative method to carry out the agricultural activities. As to make the work of the farmers easier, an Agricul-bot with weed detection is built which performs all the agricultural activities such as spraying pesticides, cutting weeds, and also detect the weed present along with the crop. Using the weed and crop database when an image or video is given as input it can automatically classify weeds and the weed position is indicated to the robot. The main objective of this project is to build a robot that carries out the agricultural activities which are mentioned above and also to detect the weed in the fields which may further damage or infect the plants. Zigbee module is used for communication purposes and power supply for the manual working of the robot. This robot moves forward, left, and right during the activity. This robot is basically built for a small area purpose. In this project, image pattern classification is used to identify the weeds depending on texture and color feature extraction. The input which is given to the laptop can either be an image or video or a live feed image through the laptop camera which is processed and classified based on Convolution Neural Network and the results are indicated. The results of this project are to identify the weeds in the field depending on appropriate features. At first, weed images are collected and pre-processed. Next, from these pre-processed images features like color, shape, and texture are extracted. Then, these images are classified as weeds and crops by using CNN classifier. Depending on the type of input image, the detected weed is indicated using CNN classifier. Then the position of the detected weed present in the input image is sent to the robot through Zigbee which then decides to spray the weedicide or use the cutter which is operated based on the height of the weed.

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IoT Based Non-Invasive Blood Glucose Level Detection

Author Name

Prof. Ravishankar. D

Prof. School of ECE Reva University Bangalore, India

ravishankard@reva.edu.in

Chethan Gowda. K

School of ECE Reva University Bangalore, India

chethangowda3020@gmail.com

Prof. Pallavi. R

Asst. Prof. School of ECE Reva University Bangalore, India

Pallavi.r@reva.edu.in

Bharath. S J School of ECE Reva University Bangalore, India

bharathgowda9810@gmail.com

Brijesh. R School of ECE Reva University Bangalore, India

brijesh29032000@gmail.com

Kashinath. N School of ECE Reva University Bangalore, India

kashinathnagaralli@gmail.com

Abstract.

Over the past few decades, with the upsurge of diabetes, an increasing number of patients are suffering from infections and pain created by the invasive method of glucose detection meters. The WHO (World Health Organization) forecasted that population suffering from diabetes will grow drastically from 171 million in 2000 to 366 million in 2030. To eradicate this vital menace, we have come up with a non- invasive blood glucose measurement device, which is an internet-of-medical-things (IoMT) enabled edge-technology. The technology includes several other Sensors, which detects SPO2, heart beat and motion, which varies due to the fluctuations in sugar level. To validate the device, the approximated glucose, SpO2, Heartbeat values are compared with the values acquired from invasive method. Non-Invasive values are stored in telegram bot, which is an IOT platform used for collecting and monitoring the data. With an exponential growth in the different devices and technologies, non-invasive glucose detection device will become methodical, cost-efficient and sturdy in the market.

Keywords. Heart Beat Sensor; Non-Invasive Glucose Sensor; Blood Pressure Sensor; Mi

I. INTRODUCTION

Glucose is an essential type of sugar in blood and is the most prime form of energy for the body's cell. After eating food or drinking, our system breaks the sugar from the food and utilizes them for energy in our body cells. Several hormones, like insulin, control glucose level in blood. Abnormalities and high level of sugar in blood causes a chronic disease called as diabetes. A hormone called as insulin is produced by the pancreas which helps to lower blood glucose level in our body. Inadequate or deficient supply of insulin, or failure of the body to properly acquire insulin causes diabetes. Therefore, the body cells fall short of much-needed energy. This can lead the ways to possible issues including blurred vision, fatigue, heart attack, stroke and damages to blood cells etc. There are several varieties of glucose detection meters available in the global

market. However, these are invasive. These invasive glucose meters use finger pricking technique for collecting blood samples, which is sometimes painful and irritating. Same needles might be used for multiple patients which can cause infections, such as skin and vaginal infections. The main aim of using non-invasive method is to get better accuracy and higher precision. It decreases the manual functions and it gives incessant monitoring system. There will be no wastage on test strips, lancets and others. It is a one-time expense with unlimited measurements. Different types of hardware's and software's are involved in constructing the non-invasive glucose monitoring device. The device is advanced by establishing a platform to display glucose levels. The device is made portable which helps to monitor the data easily.

II. RELATED WORKS

[1]. Megha S. Asekar (2018) the researchers have used the absorbance principle to find out blood glucose non-invasively. A 940nm wavelength IR rays is allowed to pass into the finger. After certain permutations and calculations, they analyzed that the voltage varies with variation in glucose concentration. The relationship between voltage and glucose concentration helps to find the glucose value.

[2]. Alvaro Lopez Albalat (2019) investigated the clinical and technical essentials that enables to build a non-invasive device to measure blood glucose level. They previously concentrated on a single technique. Later on, a feasible study was conducted which presented a non-invasive sensor combined with three different techniques: electromagnetic, acoustic speed and IR spectrograph. The prototype was subjected to various forms of bias, however by cross compensation those three techniques were able to minimize the low performance offered by the single techniques.

crocontroller; IoT Platform; Internet of Medical Things; Cost Efficient.

[3]. Heungjae Choi, Steve Luzio, Jan Beuther (2017), and

Adrian Porch developed a microwave system (NIGBM) which operated at 1.4 Giga henry, add to increase performance regarding accuracy. They obtained data from the microwave source, which was converted to estimate glucose concentration by using the principle of linear correlation. There was no time delay and the error concluded that the system is not user friendly and portable.

[4]. Shyqri Haxha (2016) reported a study which utilized near infrared sensors for guaranteed blood sugar level. Near IR transmission spectroscopy was used and Vitro experiments were conducted. They found a co-relation between voltage and glucose levels.

[5]. SiWei Zhao, Wei Tao, QiaoZhi He, Hui Zhao (2017) used Laser Light as a medium, which increases the temperature and causes stress, which in turn increases the volume of the medium and produces thermoelastic wave. Using photo acoustic signal, they determined the amplitude and frequency of the sound spectrum which is essential to find glucose level. They inferred that increase in photo acoustic sound spectrum results in the increase in the glucose concentration.

As per research, reduce in the oxygen level at the cellular level might lead to the type 2 diabetes in humans. When there's decrease in the oxygen level, there's increase in the resistance of insulin levels in the body and vice-versa. The hypoglycemia (low blood glucose level) condition is associated with slow and abnormal heart rates, whereas the hyperglycemia condition (high blood glucose level) occurs when the heart rate is high. As Glucose concentration varies, heart rate also varies simultaneously. The blood glucose level varies in diabetic patient as in high or low levels, when the blood glucose level is high, it may affect them when the person feels tiredness, vomiting, blurred eye vision where as in low glucose levels, person feels dizziness, sweating, shivering etc. Therefore, to cover majority of parameters affected by variations in sugar level and estimate their results, we did an extensive literature survey on existing "Implementation of non-invasive blood glucose level monitoring device" and came up with a distinctive and innovative idea for implementation of non-invasive system. To make the device as portable and enable to data transfer to IOT platform using Wi-Fi-module. Design a feasible blood glucose level monitoring device using Noninvasive method. To implement a continuous self-monitoring device for Diabetic Patients.

IV. PROPOSED FRAMEWORK

This paper provides a device which provides information about glucose and other health parameters which are affected by variation in glucose. This device also consists of heartbeat, SPO2 and motion (fall) sensors. An IOT platform called as telegram bot is used to monitor the data to avoid any complications with respect to health. The device also consists of other apparatus such as a LCD, buzzer, switch, Arduino nano, node MCU, which perform required operations.

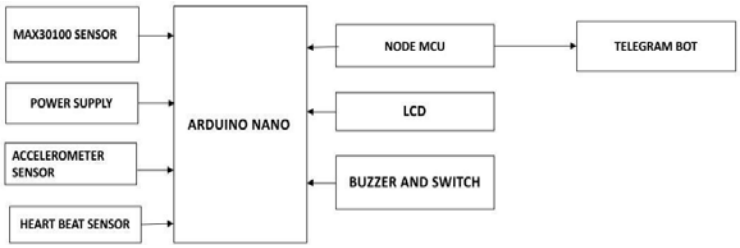


Figure-1: Block Diagram of Non-Invasive blood glucose leveldetector (Along with other parameters)

V. IMPLEMENTATION

In this project the blood glucose device provides glucose level, heartbeat, SPO2 level and fall detection measurement without using any blood sample or finger pricking methods. By placing a finger on a particular sensor, we can get the required results without damaging tissues or any body organ. The detection of heart beat, SPO2, and fall detection helps to find out whether there is a change in the glucose level. As heartbeat, SPO2 are biologically related with glucose, these are adequate parameters which provides additional information about glucose level variations. The connection is made between sensors and Node MCU with the help of Arduino. Once we provide the input feed to the Arduino the sensors start running and the software starts to identify the readings from the sensors and the values are shown in the LCD display and the readings are shown on telegram with the help of Node MCU software. We have constructed our project with different sensors such as, MAX30100, accelerometer and a heartbeat sensor, which havedifferent operational principles. We are also using other apparatus such as LCD, power supply, buzzer, switch andjumping wires.

The MAX30100 is a multi-purpose sensor used for measuring pulse oximetry and blood glucose level. This sensor consists of IR and red LED's. The oxygenated and de-oxygenated haemoglobin's ratio is taken to estimate the SPO2 level. Oxygenated haemoglobin imbibes majority of IR rays and allows red light to pass through. Whereas de-oxygenated haemoglobin takes red light and letting IR rays to transit through it. For detecting glucose, we follow the principle of Beer-Lambert law. The law relates attenuation of a light source with the material through which it travels. Here the material which we are analyzing is blood molecules. When IR rays passes through tissues, it is both imbibed and dispersed by the tissues. If a person is diabetic glucose molecules fuses with the blood, which changes the attenuation of the blood stream. With the help of deflected/attenuated light we estimate the glucose level.We make use of only IR radiations to forecast the blood glucose level.

Another main sensor which we are using in our device is the Heart beat sensor. It gives a digital output of the heartbeat when a finger is placed on the sensor. The sensor consists of a LED, which flashes every time when a finger is placed on it which indicates the generation

of pulses. The number of digital pulses within a stipulated time (10-15 seconds) is multiplied with a fixed value.

We use an accelerometer which measures acceleration and changes in the direction of an object or a human being. The sensor works on the three axes (x, y, z). Here we took only two planes for easy evaluation. It has a particular threshold value when it is in normal position. It also has a maximum threshold value when it is tilted in a particular axis. We observe these values and later set a particular threshold value to indicate whether the person is still or fallen down. If the person fell down, we have added an emergency switch. When the switch is pressed the buzzer makes sound and a message will pop up on the telegram app. The switch can used in some kinds of emergencies as well.

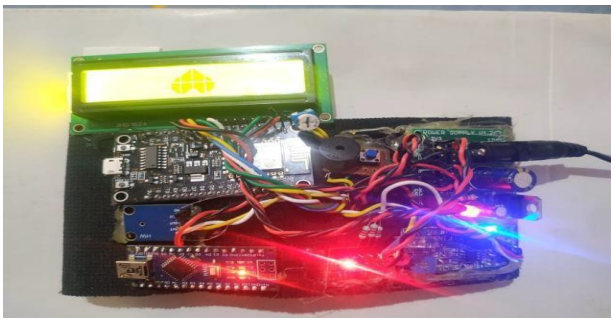


Figure-2: Implemented Circuit of Non-invasive blood glucosedetection (embedded on a band)

VI. HARDWARE AND SOFTWARE

VI.I HARDWARE DESCRIPTION

Figure-3: MAX30100 sensor

MAX30100

The max30100 sensor is an integrated glucose monitor and SPO2 monitor. It consists of LED's and diode which are responsible for determining glucose level and SPO2.

ARDUINO NANO

The Arduino Nano is a tiny board, which is user friendly. It offers similar specifications, quality and features of the Arduino Uno board but in a smaller size. Nano is programmable using the Arduino software (IDE).

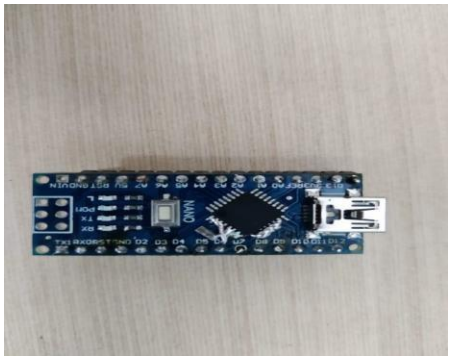
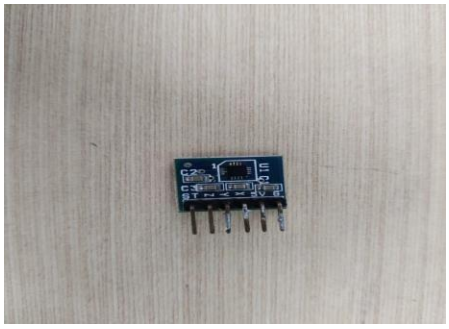


Figure-4: Arduino Nano

ACCELEROMETER

An accelerometer sensor is a device used to measure the acceleration of any object. It is used to detect the falling of a person due to variation in sugar level in our project. It works in three plane x, y, z, but we are using only in two plane x and y.

Figure-5: Accelerometer



REGULATED POWER SUPPLY

RPS is used to provide constant power supply across the circuit.

BUZZER

Buzzer is a piezoelectric type audio signaling device. It converts audio signal to sound. The buzzer is connected toa switch. As the switch is pressed the buzzer produces a sound.

SWITCH

Switches are used to turn on and off devices. Here in our project, we are using switch for emergency purpose.

LCD

A flat display which is used to display the output value of the sensors.

HEART BEAT SENSOR

A heart beat sensor is used to estimate heartbeat of a person. This sensor provides a digital output of the heartbeat. We have to place our finger on the sensor to get the required result. For each heart beat count, the LED on the sensor glows.

Figure-6: Heartbeat Sensor

VI.II SOFTWARE DESCRIPTION

ARDUINO IDE

Arduino is an open-source platform. It can be used to write and upload the software code to the circuit board.

TELEGRAM BOT

Here we are using an IOT platform called telegram bot which is a third- party application. By sending messages and commands user can interact with the bot. Using HTTPS requests to BOT API you can control your bot.

VII. RESULT

We have built the device on a band, which is presentable and comfortable. To measure the SPO2 and glucose we have to place our finger on the sensor for few seconds. To measure the heart beat we need to place the finger on the sensorrepetitively for 10- 15 seconds. To verify whether the accelerometer is working we can tilt our hand in different directions to find the fall detection. The information from the sensors will be updated in telegram bot and LCD.

Figure-7: Result Shown on LCD(FELL DOWN MESSAGE)

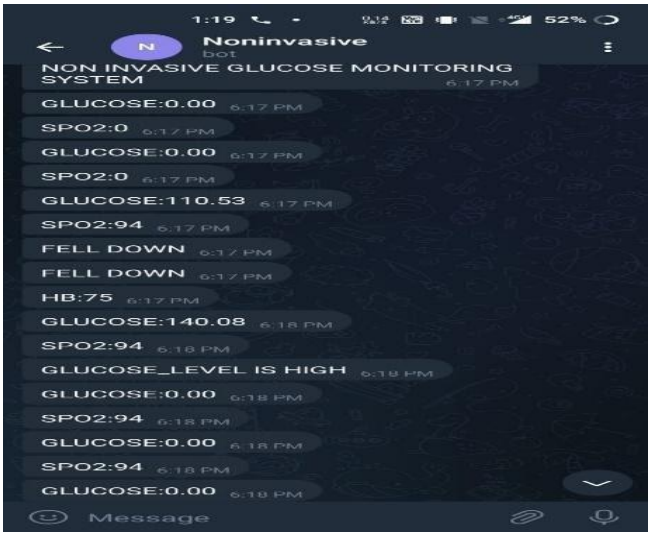


Figure-8: Result Shown on mobile (TELEGRAM APP)

SL. No	Invasive Glucose Values	Non-Invasive Glucose Values	Heart Beat Values (Non-invasive)	SPO2 Values (Non-invasive)
1	126.0	116.7	92	98
2	84.0	88.3	80	96
3	102.0	98.7	87	96
4	240.0	223.8	95	95

Figure-9: Readings from invasive and non-invasive methods

VIII. CONCLUSION

To conclude, we have developed a non-invasive blood sugar level detection device, which provides glucose levels of different samples and human specimens, which is pain- free and in a short period of time. It also provides data of heartbeat, SPO2 and fall detection by using different sensors. We have developed a telegram bot, which maintains data from different sensors.

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Knowledge & Information Management in Academia: A User-led approach

[1]Ajay Kumar H P, [2]Harish Kulkarni, [3]Shubhendra Singh Sisodia, [4]Manoj Kumar J M, [5]Dr. Amrut Anilrao Purohit

School of ECE , REVA UNIVERSITY

[1]ajaysnandan@gmail.com, [2]gkbkulkarni@gmail.com , [3]shubhendras62@gmail.com, [4]manojkumarjmmanojkumarjm@gmail.com, [5]amrutanilraop@reva.edu.in

Abstract.

In today's technology-dominated society, data and its various post-processed forms are considered an invaluable asset. Information or Knowledge that's derived from the raw data is of little or no value unless it is actionable. The user who dons multiple hats of author, viewer, and consumer of information hence is the most vital cog in the system. This is even more pronounced in academic institutions where sharing and transfer of knowledge are of prime importance, yet its execution remains extremely challenging. Knowledge Management System (KMS) is the platform deployed to facilitate information sharing and provide a smoother transition of information transfer and integration. Through this journal paper, we propose the development of an IT-enabled academic management platform wherein every feature is planned and designed keeping the user as the centrepiece. By doing so, technology will be the enabler and user the core of the underlying system working in sync with each other to create a seamless and unified interface to manage and control various aspects of learning in an academic institution like quizzes, assignments, regular assessments, and a document repository of learning resources for continual learning and reference. The KMS/LMS module along with other modules such as feedback, academic performance, etc. will be part of an umbrella ERP application providing greater flexibility and opportunities for analysis, engagement, and future scope for modifications that would benefit all the stakeholders who are part of the system.

Keywords. Enterprise Resource Planning, Knowledge Management System, Learning Management System, Information Systems, Explicit Knowledge Introduction

1. INTRODUCTION

Technology today is evolving at a rapid pace and has become synonymous with our everyday lives. From voice commands to set our morning alarm to apps that provide a dashboard view of our monthly spending pattern or academic progress charts, most aspects of our daily routine are technology-led. That being said, we the user form the crux of this ecosystem by generating, updating, and harvesting the humongous amount of data being created for various purposes. Emerging disciplines like data science, artificial intelligence, machine learning, etc. rely on human ability and intuition to sift and sort through the

available data and information to produce actionable insights and present knowledge patterns.

This creates a need for an effective solution that could collect, curate, and combine the information available. Knowledge management (KMS) is the collection of methods relating to creating, sharing, using, and managing the knowledge and information of an organization. It refers to a multidisciplinary approach to achieving organizational objectives by making the best use of knowledge gained.

Knowledge Management becomes even more crucial in academic institutions and other portals of learning where providing effective solutions to the persistent issues of the society through research, innovation, and serving as a pipeline of talent and skilled manpower is of prime importance.

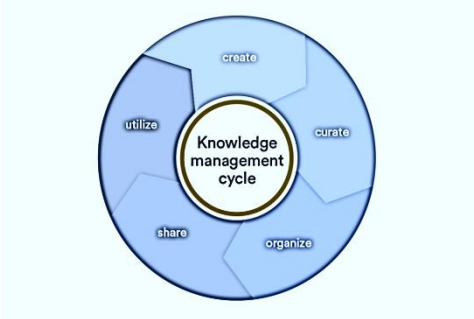


Fig 1.1 Knowledge Management Cycle

Tom Davenport defined Knowledge Management as the process of capturing, distributing, and effectively using knowledge. One of the most important aspects KMS is trying to achieve is rich, deep, and open communication not just internally within an organization but also with the outside world.

The proposed platform intends to be a one-stop shop for all the direct and indirect stakeholders of the academic community serving the various needs of the academic industry and enabling value creation, fostering innovation, and achieving set goals.

The eventual vision or objective of this project is to combine the processes of Knowledge Management with other modules such as the Feedback platform to acquire a deeper understanding of the areas that need to be streamlined and increase the effectiveness and utilization of the KM platform. This not only helps in enriching the KM effectiveness but also aids in improving the overall quality of the academic institution and paves the way to set new standards and benchmarks in learning

2. LITERATURE SURVEY

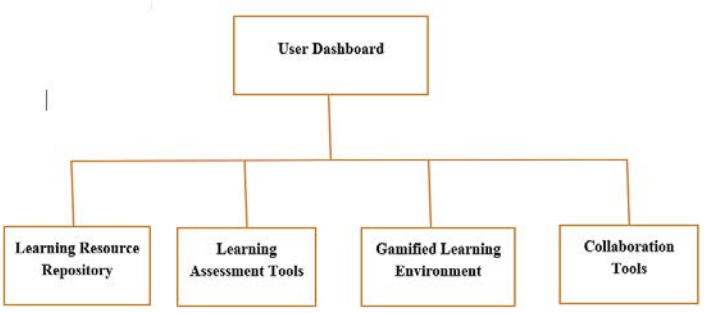
Knowledge Management System is based on the conviction that knowledge is a valuable core asset, and its effective utilization is critical to the goals of the institution. Knowledge constitutes an intangible and concrete asset and is acquired from lessons learned together with new ideas and concepts. As a strategic resource, knowledge requires ongoing

continual assessment of its use through effective and productive management to ensure that it is optimal.

A review by Jose Miguel Baptista Nunes, Saima Kanwal, and Muhammad Arif from the Sun Yat-Sen University, China [1] found that there is a clear awareness in academic circles about the importance of knowledge management more specifically in higher educational institutions. They also concluded that there is a need to include and integrate all stakeholders in an institution rather than just administrative staff.

A conceptual study by Dev Raj Adhikari [2] stated that the application of knowledge management concepts is important in achieving the goal of quality education in an educational institution.

A study of Knowledge Management practices in several higher education institutions across Europe, Asia, and Gulf countries by Nishad Nawaz, Susanne Durst, Hariharasudan A., and Zurabi Shamugia [3] opined that the involvement of academic faculty is crucial in strengthening the effectiveness and quality of universities and underlined the benefits of using integrated knowledge management systems that provide enhanced collaboration, easy accessibility and lead to improvement in knowledge management benefitting internal and external stakeholders.



Dr. Nanjundeswaraswamy T.S and D R Swamy from the JSS Academy of Technical Education in their January 2021 Emerald Insight research article [4] analyzed that favorable organizational cultural factors are essential to establish an efficient KM process in an organization. They also found clan culture to be a major influencing factor in higher educational technical institutions wherein employees were attached through high commitment and loyalty. The employees in such organizations were willing to share information with others and considered leaders of such organizations to bementors. The employee morale in such organizations was high which directly resulted in positive output.

In this regard, an Enterprise Resource Planning system for academia appears to be a dream come true. These commercial software applications promise the seamless integration of all the information flowing through an institution. By integrating KMS with other systems like feedback modules, the systems can be made more intelligent and insightful.

Thomas H. Davenport in his 1998 Harvard Business Review article [5] noted that ERP systems can deliver great rewards but also carry great risks that can alter the strategic direction of an enterprise. According to him, A speedy implementation of an enterprise system may be a wise business move, but a rash implementation is not.

3. METHODOLOGY

The user database is the foundation of any ERP system on top of which all the other modules are built upon. The user who accesses the application is the most strategic piece of the entire puzzle as every function or purpose undertaken through the different modules of the system is driven by user-initiated action.Hence, we have used a top-down approach in building the application platform with the user serving as the source or starting point. The types of users might be students, Faculty, Administrative staff, etc.

The basic ERP application structure and functional blocks of the KMS application built on top of the user data stack are subdivided into multiple segments as represented below.

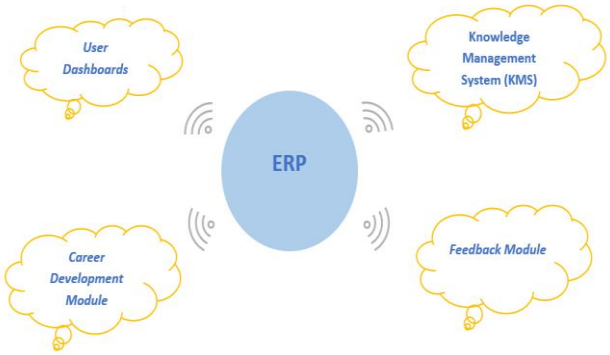


Fig 3.1 Basic structure of the ERP Application

Fig 3.2 Functional block diagram of KMS Module

- Learning Resource Repository: This would house various learning resources shared by faculty like subject notes, PowerPoint slides, e-textbooks, etc. that could be accessed by students for their learning needs.
- Learning Assessment Tools: This would have various tools for the creation of question papers, quizzes, and assignments for continual assessment of a student's learning journey and to track their progress.
- Gamified Learning Environment: This would consist of learning resources that use non-traditional methods like puzzles, trivia, finding the missing block, etc. to stimulate the creative side of the students while at the same time ensuring knowledge transfer of target content.
- Collaboration Tools: We intend to develop an information exchange platform to enable open and seamless communication between various stakeholders of the academic community to exchange ideas and other information worth sharing.

The above avenues of knowledge platform not just allow users to create information or access information shared by other users of the application, which is rudimentary on any data-sharing platform, it also encourages them to collaborate and involve themselves throughout the various phases of the knowledge management lifecycle thereby leading to higher levels of user engagement leading to greater efficiency and quality of knowledge insights generated off the platform.

We also intend to add a credit card-like reward structure by adding bonus points to users for various activities that they perform while accessing the application. This benefits both the user and the academic institution. From a user perspective, it motivates them to be more active and involved on the ERP platform since they get rewarded for the same. The academic institution benefits by allowing users to redeem their accumulated points for academic branded merchandise that would serve as an avenue for advertising, loyalty-building, and creating strong brand ambassadors with no considerable effort.

Furthermore, we plan to include options to share or transfer knowledge between academic institutions through the platform that would broaden the reach and increase collaboration that would mutually benefit the institutions themselves and the society at large.

4. FEATURES OF THE APPLICATION

The users of the application are broadly classified into Student, Faculty, and Administrative Staff. The features and options available would differ based on the category of the logged-in user.

Students: They are the end-users of the application who consume the various types of content created for their educational purposes.

Faculty: Users of this category are the teaching staff of the institution who also serves as the major source of all the data that is created for the students.

Administrator: These users are part of the college management, or the application support staff who manage and monitor the various functionalities of the application.

The various functional modules of the application in its current iteration are as mentioned below:

- **Registration module:** Student users requiring access to the application must navigate to the registration page and submit the form by filling in all the relevant information. Such requests would need approval from the corresponding faculty before they access the application. New faculty accounts are created by the administrator, post which they would be able to log in to the application with the supplied credentials.

- **Login Module:** User accounts that are approved and active can navigate to their respective login page and sign into the application. An option to reset the password is also

available on the login page as well as on the user dashboard.

- **Attendance Module:** This module allows faculty to update daily attendance. Students will be able to view their attendance report with the total number of classes held, classes attended, and classes absent.

- **Notes Module:** Faculty can upload study materials and notes for their subjects. Students will have the option to view the content uploaded by the faculty.

- **Syllabus Plan Module:** Faculty has the option to update the syllabus plan and schedule required days for completion. The same is viewable by the student.

- **Timetable Module:** Faculty and Admin users can schedule a timetable for each course or subject. Students will be able to view the published timetable.

- **Discussion Module:** This feature works like a Q&A platform wherein students can post their academic-related queries. Faculty or other students will be able to respond to the queries posted. This provides an open channel for communication between the students and faculty and aids in the quick resolution of posted queries. This also could be a place for discussions regarding various activities in the institution like cultural fests, technical conferences, social impact events, etc.

- **Feedback Module:** This module allows students to provide their opinion and feedback on academic topics, faculty, and other factors like campus infrastructure, etc. Students have an option to provide a rating as well as add their suggestions or comments that could help the management better analyze and act on the provided feedback.

- **Reporting Module:** This module provides an option to view reports regarding various parameters like attendance, feedback, examination, etc. This could be useful in providing a summarized view of the parameter that the user is trying to analyze and serve as a basis for creating an action plan, if necessary.

- **Quiz/Assignment Module:** This module allows the faculty to create and post quizzes and assignments to be attempted and completed by the students. Faculty will have the provision to set a deadline for the quizzes and assignments to be completed and could also include additional instructions if any.

The various technologies and tools used to develop and implement the ERP application are

as mentioned below:

HTML: An acronym for Hypertext Markup Language, this widely used web page design framework has served as the basis for the development of the application.

Cascading Style Sheets: CSS as its commonly called is the language used to style the web pages and structure the layout of various web pages across the application.

JavaScript: It is one of the most popular programming languages used along with HTML and CSS to develop web pages that are lightweight, dynamic, and provide interoperability.

PHP: It is an efficient server-side scripting language that is very useful when designing interactive and dynamic web pages such as the ones used in this application. It is widely regarded as the most popular language for web development.

MySQL: It is an open-source relational database management system.MySQL supports multiple OSes like Linux, Windows, Mac OS, etc. It is commonly used with PHP to create dynamic, fast, and powerful web-based enterprise applications. MySQL is popular as it is faster and has the ability to handle large data sets.

The database of the current version of the application is organized into the following tables:

- Admin
- Attendance
- Course
- Discussion
- Exam
- Faculty
- Feedback
- Notes
- Student
- Subject
- Timetable

5. CONCLUSION AND FUTURE SCOPE

We live in a world that is transitioning from a connected world to an age of augmented reality where the lines between virtual and real-life which are already blurry will be present yet invisible. Artificial Intelligence, Semantic Web, Cloud databases, big data, etc. are the technologies characterizing the next evolution of the way information will be used and handled that not only affects our digital world but also our reality.

The proliferation of metaverse and the flexibility it offers by allowing environments to be viewable on any device, be it a smartphone, wearables, etc., and the industry 4.0 that's been collecting a humongous amount of data for years combine to create immersive experiences and a more engaging user experience. Communication technologies like 5G and satellite links are ready to deliver the required bandwidth to ensure a smooth experience.

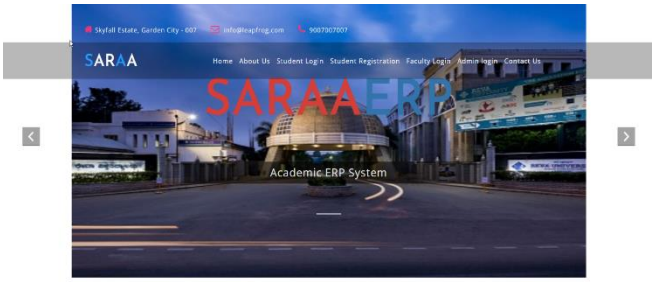
This convergence of various technologies and the user at the epicenter of it is the emergence of a new wave that could bring about a paradigm shift in the way we perceive real life. But all this is just the beginning of an era of experimentation that holds the key to unlocking new solutions and a better way to do things and where better than portals of learning as a testbed for it all.

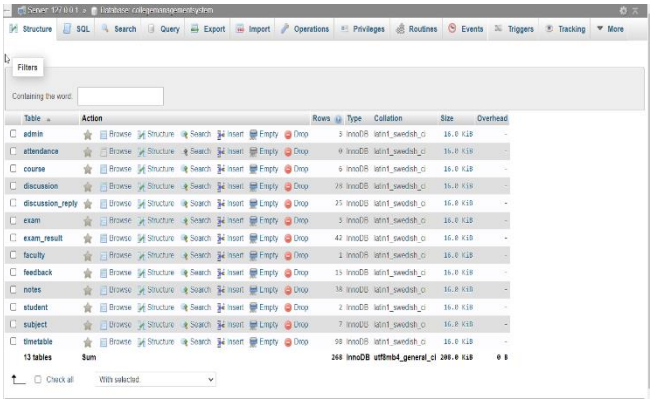
From being a plain jane, IT-enabled Academic Management System to a whole suite of applications that can keep up with the industry trends, the opportunities are limitless. While Web 1.0 to 3.0 was focused on improvising communication, Web 4.0 will be all about collaboration. Considering the infinite churn of fresh minds that happens in academia, innovation is just the tip of an iceberg.

The future is all about the convergence of data availability and the genius of the user making optimal use of it to create something stunning. As a wise man once quoted *"*Too often we forget that genius, too, depends upon the data within its reach, that even Archimedes could not have devised Edison's inventions."

6. RESULTS

All the modules of the current iteration of the application are working fine after software design, development, implementation, and testing. Snapshots of the ERP homepage and backend database tables are as mentioned below.





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Execution Investigation of FinFET found 4:1 Data Selectors for small Optimization of Power

Author Name

K Md Saifuddin,

Electronics & Communication Engineering,

Srinivasa Ramanujan Institute of TechnologyAnantapuramu, India

saifu426@gmail.com

T. Keerthi Priya ,

Electronics & Communication Engineering,

Srinivasa Ramanujan Institute of Technology,Anantapuramu, India

keerthireddy104@gmail.com

Y.RajaKullayi Reddy

Electronics & Communication Engineering,

Srinivasa Ramanujan Institute of Technology,Anantapuramu, India

yrkreddy36@gmail.com

Abstract.

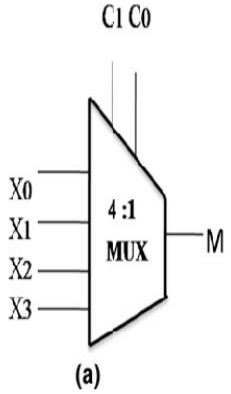
Gate Diffusion Input (GDI), which uses FinFETs, is correlated with Pass Transistor (PT), which uses Pass Transistor (PT) based 4:1 Data Selector. A 0.6V supply voltage powers both of the Data Selectors, which are built on 22-nm technology nodes. GDI Data Selector utilizes less power than that of the PT Data Selector, which consumes more power. GDI-based Data Selector is a good choice if the client wants a rapid execution. Faster than a PT-based Data Selector, typically takes a few picoseconds before pass the signal. The GDI-based Data Selector, on the other hand, has greater performance when optimized for low power consumption. Due to its widespread usage in combinational circuits, this Data Selector may significantly enhance the overall performance of the network if its execution is optimized.

Keywords. FINFET, Gate Diffusion Input (GDI), Pass Transistor, Data Selector

1. INTRODUCTION

Because of the rapid advancements in CMOS technology, the electronics industry is now able to integrate more complex systems at ever-increasing speeds. The IC is becoming increasingly sophisticated and dense as transistor sizes continue to shrink. One of the most essential design considerations for integrated circuits (ICs) is power consumption. To reduce IC power consumption, voltage down-scaling has proved quite effective. Some applications, like medical equipment, portable wireless devices, including sensor network nodes are decreased in power if indeed the power supply is lowered slightly over the threshold voltage [1]-[3]. To meet consumer demand for low-power devices, the industry has made tremendous standardization progress and power dissipation have taken on new importance

in terms of performance and footprint [2]. Low power consumption has become a hot subject in today's hardware market. In a multiplexer, each input is combined into a single output, as well as a select line determines whether input should be sent to the outgoing



C1	C0	M
0	0	X0
0	1	X1
1	0	X2
1	1	X3

(b)

Fig.1. Schematic structure of 4:1Data Selector

"Switch logic" is being used to create the circuits of a 2:1 multiplexer rather than gates. As seen in Fig. 1, a 4:1 Data Selector features a single output having two inputs as well as a single choose line that is used to pick towards the input Many issues arose in MOSFETs owing to the small channel as the technology node decreased, such as DIBL, impact ionization, the Hot electron effect, and voltage saturation. Short-channel effects may be addressed via FinFET technology, which delivers the superior results and voltage with the lowest possible power consumption. Due to the smaller surface area of FinFETs compared to MOSFETs, they use less power, function more quickly, and need lower power supply voltages [4]. When it comes to FinFET vs. MOSFET, these regions are split.

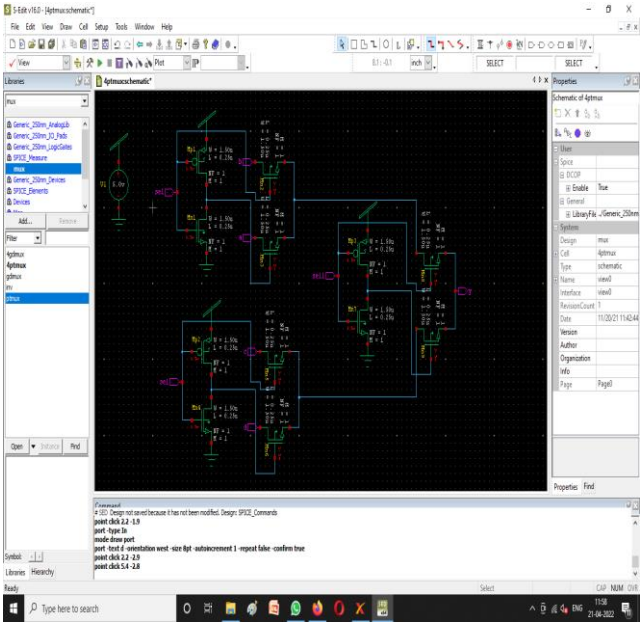
FinFET multiplexer designs also have been described by a few researchers at various technology nodes was presented as part of a new TIGFET architecture. Additional research has shown that the size may be reduced by adopting FinFET at 45nm technology. A total of 2.68nW and 16.89pW more leakage power was found in this design, however the propagation latency was measured at 1.76ns.

In 45nm technology, DGFINFET achieved delays of with PT (Pass Transistor) is discussed in this work. FinFET at the 18nm technology node was used for Muxis. Cadence Virtuoso software is being used to examine the steno multiplexer's results in latency.

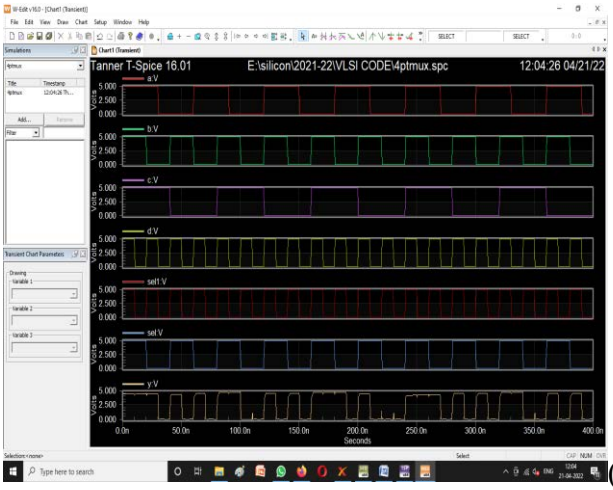
GDI BASED DATA SELECTOR

Cells with the GDI (Gate Diffusion Input) feature are a new form of circuit that may be used to combine power. With the help of this GDI cell, a more sophisticated circuit may be built with fewer transistors. When it comes to transistor count, latency, and power consumption, the GDI cell outperforms the CMOS. As that of the transistor count doubles in CMOS, overall circuit size grows and signals take longer to travel from either the source to the destination due to the obvious increased area. The GDI cell, which reduces area, latency, and power, may alleviate all of these issues. [7]-[9] is indeed an inverter circuit that uses two transistors of NMOS and PMOS, and that it's similar to the GDI cell. Sources of PMS

and NMOS for inverter CMOS cells were linked towards the supply voltage whereas in GDI cells they are attached towards the signal input. Gate Diffusion Input (GDI) has many benefits and downsides. There are some advantages and disadvantages to each and every system, such as quick operation, low power dissipation, as well as an output that isn't close enough from the Vdc supply voltage. Because NMOS produces weak1 just at output node when Sel=B=1, the input signal B would be routed towards the output O when Sel=B=1. This means that even though the output O would be 0 whenever the input signal B was 0, overall output would be 1.



(a)



(b)

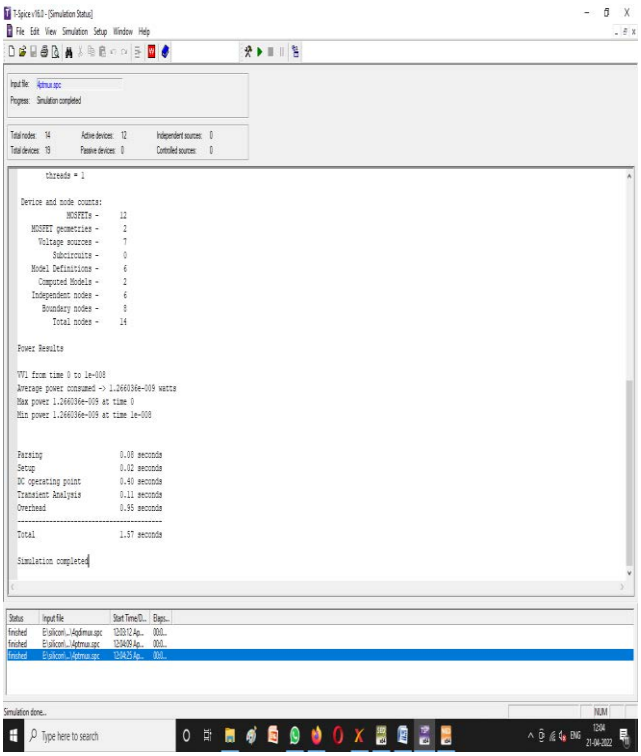


Fig. 2. (a) Schematic design, (b) Output plot with Total Power Dissipation and(c) Output plot with Static Power Dissipation for GDI based Mux

Input signals A and B were coupled to the PMOS and NMOS source terminals, respectively. This Select signal is coupled towards both MOS, which results in output voltages of 0.7V and 140.8mvolts, respectively. The output was coupled directly towards the input signal B when Sel=1. It is shown in Figure 2 the output of the Mux using GDI (Gate Diffusion Input) (b).

That figure also shows the overall power dissipation, which is 46.69uW at its highest and 123.2pW at its minimum. The leakage inside the circuit was caused by dynamic power dissipation.

PT BASED DATA SELECTOR

One inverter is being used to invert select signal with PT-based Mux architecture. A circuit schematic of PT (Pass Transistor) built on MUX is shown in Figure 6. Using fewer transistors, it is possible to create more complicated circuits [10–12]. The input signal is linked to the NMOS source, while the select signal as well as its inversion are connected towards the gates. Because NMOS generates weak1 at the output This is really a disadvantage of utilizing this device.

Some of the advantages of PT-based Data Selectors include lower power consumption, a less impact on interconnection, as well as a faster rate of processing and transmission. Sluggish functioning as well as a reduced voltage swing are some of the drawbacks.

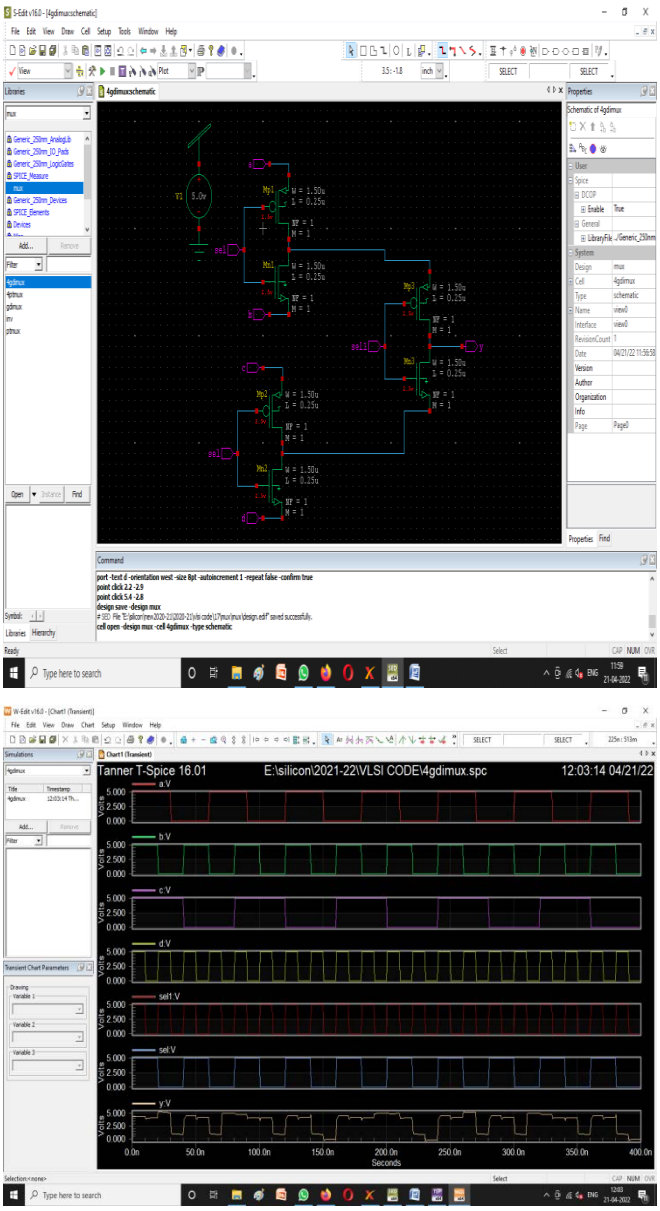
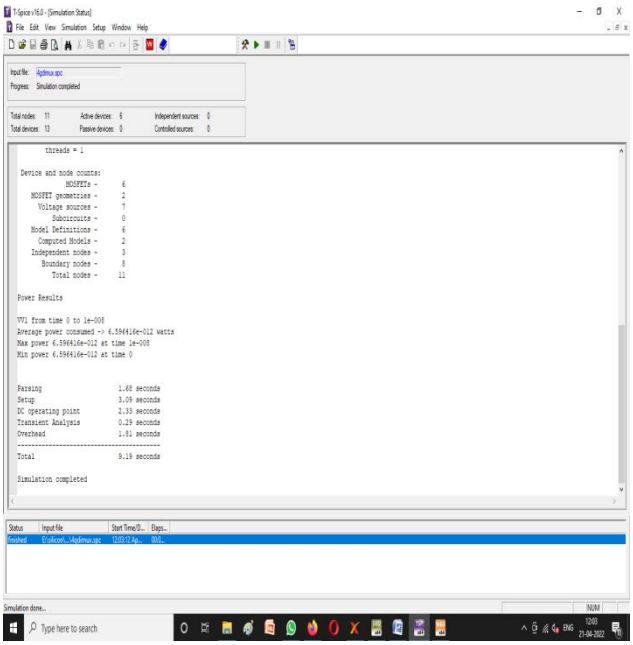


Fig. 3. (a) Simplified 0utline, (b) Total Power Expenditure and (c) Static Power Expenditure for PT based Data Selector



Pass transistor-based multiplexer schematic can be seen in Figure 3(a). Input signals A and B are linked to the source. A select signal was linked to the gate from one NMOS, and the inverting select signal was coupled to the gate of all the other NMOS. Fig.3(b) shows the waveform of the output. NMOS delivers weak 1 there at output

therefore the output becomes when Sel is 1, and if B is 1, then output is 659.62mV. NMOS outputs a strong 0 when Sel is 0, therefore due of this. Fixed Static power dissipation throughout this example is 17.57nW, which really is higher than the are used to pass that input signal throughout the output multi-input multiplexer (NMOS). When Sel is set to 0, input A leaks to the NMOS, where input B was attached, resulting in a malfunction.

DELAY AND POWER ANALYSIS

Its delay and power consumption of the multiplexer were examined in depth throughout this section. For optimal performance, a circuit would have to be quick and power efficient. Li

Mux	Power		Average Power
	Max	Min	
GDI Based Data Selector	1.269uW	124.2pW	1.266nW
PT Based Data Selector	6.59uW	6.39nW	6.596nW

sted in Table 1 are the highest, lowest, and average power values.

Delay and energy dissipation are studied in this part using a 0.8V power source. It takes 2.11ps in GDI-based Mux for input A to approach the output whenever a select signal is 0, but 9.09ps in PT-based Mux for input A to reach this same output when a select signal is 1, and 10.72ps in GDI-based Mux for input B to reach windows output whenever a select signal was 1. Assuming an average power dissipation of 6..594nW as well as a static power dissipation of 17.57nW, that is measured either by circuit's delay. With a longer delay, this circuit must spend more time before it can produce

an output. This value represents the circuit's overall power usage. Where Vdd seems to be the supply voltage and Iavg is indeed the average current, respectively. Static and dynamic power dissipation combine and is

Shown using by,

P(t)=Vdd×I(t) (3)

Static Power Dissipation is,

P=I×Vd(4)

STATIC POWER DISSIPATION

Just after power and delay computation power delay product were determined, which would be the multiplication from both delay & power, denoted by PDP.

PDP=Delay ×Power (7)

Circuit performance may be better understood by designers and end users alike thanks to all these circuit performance estimates.

CONCLUSION

The FinFET 18 nm technology node has already been successfully demonstrated using two separate techniques. GDI and PT-based Data Selectors have the highest power dissipation. GDI-based Mux performs better in terms of latency and power consumption in both cases. In terms of power consumption, GDI-based Data selectors consumes 1.266uW, which really is 1.266 percent below than PT-based Mux. Average power dissipation, GDI, and PT-based Mux dissipates 6.596nm and 6.39nW for the GDI mux, respectively. It is 6.3 times quicker than PT-based Data Selector in terms of operating speed, which means that GDI is more efficient than PT. Although each Data Selector function differently, it is possible to pick a suitable Mux for just a given circuit design based on a designer's needs, according this research.

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Computer Vision based Text to Language Translation

Devanshu Roy[1], Dhanyata S. Nayak[2], Bhuvaneshwari G.[3], Chandana B. N.[4], Dr. Shantala Devi Patil[5]

[1,2,3,4]*School of Computer Science Department,* [5]*Associate Proffesor, Reva University, Bangalore, India*

Abstract— Blind people face immense difficulty understanding and comprehending text due to inability to see said text, and need external assistance to guide them with the same. Also, tourists face the obvious issue of language gaps and comprehension difficulties of the local language. The goal here is to give users a way to understand any text with their own comfortable language. This paper proposes an application that uses a fast and accurate text to language translation system and uses a text-to-speech library to speak the translated text out to the user. In this work, we propose Computer Vision to capture and detect text from cameras and Tesseractv5, an OCR based on a Long Short-Term Memory (LSTM) to classify said text into alphabets. Then we use translation on said text, to the desired language and use Text-to-Speech libraries to output the same in computer generated speech. Furthermore, also a Python module has been developed that can be used to convert English text to computerized Braille script.

Keywords—Language translation, OCR, Text-to-Speech, Computer Vision, OpenCV, computerized Braille.

1. INTRODUCTION

Billions of people in the world are visually impaired. It is a huge struggle for them to understand texts written on a piece of paper, and thus forcing them to use systems like Braille text, to feel and understand text. Although there are many electronic equipment that can assist in reading, there are few to actually translate the same for them. Also, life would be more convenient if said blind people could use a computer program to read out that same text to them, thus making them independent in the process.

Also, in today's world, where travelling is so common between various nations, language gaps are a challenge to a satisfied tourism experience. Also, the biggest issue tourists might face when they visit a certain place, is to understand the texts in the national/local language of their own place. This paper proposes a Computer Vision solution to capture and detect text from cameras and Tesseractv5, an OCR based on a Long Short-Term Memory (LSTM) which is a type of Recurrent Neural Network (RNN) to classify said text into alphabets. Then translation is used on said text using Python module 'translate', to the desired language and use Text-to-Speech library, called gTTS in Python, to output the same in computer generated speech.

Furthermore, for people who are both blind and deaf, a Python module has been developed that can convert English text to Braille. This means the translation from source language can be done to English, then converted to Braille text, which can have further applications for comprehension of the text to the blind and deaf user.

2. LITERATURE SURVEY

Handwriting-feature-based algorithms have been designed to approach the handwriting problem [1] as if it were a voice recognition problem, that is, by treating the input as a signal.

User input in handwriting recognition has a defined beginning and end, similar to how data points are segmented [2].

Optical character recognition (OCR) is a technique for converting scanned or printed text images[3], as well as handwritten text, into editable text that may be further processed.

The output of OCR is the text, which is saved in a file when the text is converted to speech (speech. txt). To transform the text to speech, Festival software[4] is utilised.

[5] illustrates a practical use of these technologies, in which a TTS approach is leveraged to provide voice-assisted text reading, followed by OCR to detect it.

Edge AI accelerators like the Neural Compute Stick-2, OpenVINO, and TensorflowLite are featured in [6,] as well as smart depth sensors such as OpenCV AI Kit-Depth.

It was suggested that a person with a visual impairment could benefit from a low-cost mobile application[7]. Optical character recognition (OCR) and text-to-speech (TTS) technology can be used in the smartphone app. The users will hear an alarm sound to let them know what occurred in the mobile application.

3. TESSERACT OCR

Tesseract [8] (latest versions 5.x.x) is an Open-Source Optical Character Recognition (OCR) Engine that is licensed under Apache 2.0 license. Starting from version 4.x.x, it has implemented an LSTM Deep Learning model, that is based on a Recurrent

Neural Network (RNN), giving fast and accurate results. The inclusion of the RNN LSTM has also given the users with the facility to train their own data sets and models, to be used with Tesseract OCR Engine.

4. METHODOLOGY

Firstly, camera input is taken, image is extracted and preprocessed. Alternatively, an image stored in local storage can also be used. Then, a competent Optical Character Recognition algorithm called Tesseractv5 is implemented to extract text from the image. Tesseractv5 is an Open-Source OCR algorithm.

The text is then processed, and then translated using translation APIs, one of the best being Python "translate" API.

Translated text then is fed to a Text-to-Speech API, to speak out the translated text to the user. gTTS Python module, based on Google Text-to-Speech is a competent API for the same. Refer the below figure 1.1 for the flowchart of the workflow of the translation module.

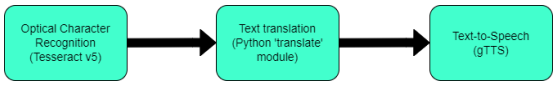


Fig 1.1 – Flowchart of Workflow

The Python library "pytesseract" is used to make usage of Tesseract in Python. pytesseract (Python Tesseract) is a wrapper for the Open-source OCR engine called Tesseract.

OpenCV is also used, which is an Open-source Computer Vision library. It is used to read the image file locally, or via camera input, and then resize the image to a smaller resolution than the system resolution. OpenCV also has a functionality to eliminate noise in captured images by blurring the image using Gaussian blur.

```
void cv::GaussianBlur ( InputArray    src,
                        OutputArray   dst,
                        Size          ksize,
                        double        sigmaX,
                        double        sigmaY = 0 ,
                        int           borderType = BORDER_DEFAULT
                      )
```

Fig 1.2 – cv2.GuassianBlur() official Syntax

This helps eliminate noise in images by smoothening the edges in the images.

Hence resizing and gaussian blurring is the necessary pre-processing applied on the images.

After detecting the text from image, this text is then stored in a variable, and pass this to a translate module. Python 'translate' module is the module of choice. Then the Translator class from the module is imported. Then an object is created with this class, and it has a method 'obj.translate(to_lang="", from_lang="")' that takes in two arguments, to_lang to specify the destination language and from_lang to specify the source language. The package 'langdetect' is used, which is a Python library to auto detect the language from the OCR text, and then specify the user's selected translation language, then pass them in the function.

The output from this function is a text object, containing the translated text. Now, a Text-to-Speech library (gTTS) in Python is used to convert this text to computer speech. gTTS generates .mp3 files with the computer speech, and these files are to be deleted after code execution. Hence os.remove in Python is used, to remove the generated audio files (.mp3 files). This requires importing of the 'os' Python library.

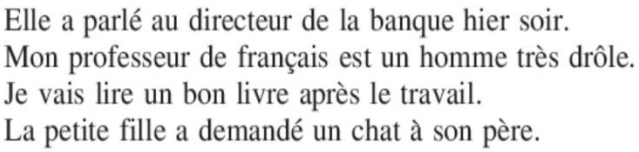
A Python module 'braille.py' is also developed which contains a method 'toBraille(text)'. This takes in text input in English, and return the corresponding Braille output using the ASCII characters equivalent of the Unicode for the Braille characters. The Braille ASCII characters were taken from Calculla's website [9].

5. EXPERIMENTAL RESULTS

The resultant program was tested with multiple test input images:

French to English:

Input image:



Output from OCR:

```
In [1]: runfile('C:/dROY_stuff/Education/MajorProject/C
Education/MajorProject/Code/MajorProj')
Detected language = fr
Elle a parlé au directeur de la banque hier soir.

Mon professeur de francais est un homme trés dréle.
Je vais lire un bon livre aprés le travail.

La petite fille a demandé un chat a son pére.
```

Translated output:

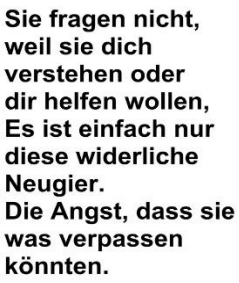
```
She spoke to the bank manager last night.

My French teacher is a very good man.
I'm gonna read a good book after work.

The little girl asked her father for a cat.
```

German to English:

Input image:



Output from OCR:

```
Education/MajorProject/C
Detected language = de
Sie fragen nicht,
weil sie dich
verstehen oder

dir helfen wollen,
Es ist einfach nur
diese widerliche
Neugier.

Die Angst, dass sie
was verpassen
konnten.
```

Translated output:

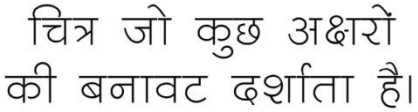
```
They do not ask,
because they ask you
or

want to help you,
It's just
this disgusting
curiosity.


what could be missed.
```

Hindi to English:

Input image:



Output from OCR:

```
In [1]: runfile('C:/dROY_s
Education/MajorProject/Cod
Detected language = hi
चित्र जो कुछ अक्षरों
की बनावट दर्शाता है।
```

Translated output:

```
Pictures that contain a few letters The texture of the carpet is imposing.
```

(Note: Indian language translation isn't fully accurate, there is a scope for improvement)

English to Braille:

```
PS C:\dROY_stuff\Education\MajorProject\Code\MajorProj>  & 'C:\Users\
\lib\python\debugpy\launcher' '63384' '--' 'c:\dROY_stuff\Education\Ma
Please enter some English text:This is a test for English to Braille.
Entered text:  This is a test for English to Braille.
Braille text:  ⠠⠞⠓⠊⠎ ⠊⠎ ⠁ ⠞⠑⠎⠞ ⠋⠕⠗ ⠑⠝⠛⠇⠊⠎⠓ ⠞⠕ ⠃⠗⠁⠊⠇⠇⠑⠲
```

This Braille text was verified online to translate back to the input text.

Since this approach uses Tesseractv5, which is an Open-source OCR software based on an RNN architecture, it leverages a Recurrent Neural Network for the OCR detection, hence giving us more accurate results than competing free solutions for OCR. Furthermore, with the introduction of v5.x.x, the operations were reduced from double operations to float operations, which reduced the resource overhead, hence it gave a better and faster performance compared to v4.x.x of Tesseract.

6. Conclusion and Future Enhancement

So, this program was able to detect, translate and output text in an image file, captured either from a camera input, or stored locally. The braille module was also successfully able to convert English text to corresponding Braille output. The Braille output is limited to Grade 2 Braille only. Furthermore, there are some translation inconsistencies with Indian languages, which have future scope of improvement.

With sufficient image data sets, hand writing detection can also be implemented by training the data sets using the LSTM model built into Tesseract OCR.

7. Acknowledgement

It is our privilege to express our sincere gratitude to our major project guide, Dr. Shantala Devi Patil, for sharing her valuable inputs, guidance, cooperation and constant encouragement throughout the duration of our project.

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We also take this opportunity to thank all our lecturers who have helped us in this project.

We thank and pay respect to our parents and friends for their support and encouragement throughout.

Last but not the least we would like to thank all those who helped us directly or indirectly throughout the project.

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Restaurant Recommender using Machine Learning

Sailaja Thota [1]
Professor, School of CSE
REVA University
Bengaluru, India
sailaja.thota@reva.edu.in

Shashank K S [2]
Student, School of CSE
REVA University
Bengaluru, India
shashankreddy0709@gmail.com

Sahil Ahmed Shaik [3]
Student, School of CSE
REVA University
Bengaluru, India
sahilahmedshaik63@gmail.com

Siddesh B R [4]
Student, School of CSE
REVA University
Bengaluru, India
siddesh2000br@gmail.com

Shashidhar Reddy [5]
Student, School of CSE
REVA University
Bengaluru, India
reddyshashidhar74@gmail.com

***Abstract*—Recommender systems widely use Sentimental Analysis in a variety of industries, including the cuisine industry. Food Quality, pricing, and service quality are the static parameters on which most recommendation systems solely depend. Extraction of food preferences from user remarks and Analysis of user needs leads to individualized guidance, filling a study gap in the literature. This paper suggests a context-aware recommender system that extracts users' food choices from their reviews and recommends restaurants based on their predilection. To group the names of food from user reviews and to show the restaurants to match their sentiments towards food. Finally, nearby top 5 open restaurants are given as output based on users' needs. For evaluation, we have used the Zomato data set available on Kaggle and applied various algorithms to build our model that provides content-based recommendations. As per the results, the suggested system can give suggestions like Restaurant, Rating, and Location to consumers with a high level of precision.**

Keywords—Sentiment Analysis, Restaurant Recommender, Food Preferences, Content-based suggestions, Ratings

I. INTRODUCTION

In this model, data is gathered on an end user's interests across a variety of categories, in order to help them make better selections. It is difficult for visitors and tourists to find a restaurant in unknown locations where there is a wide range of restaurants. Website and social media platform comments are increasingly regarded as a big source of data. The processing of these replies, as well as the analysis of their emotions, may indicate the user's gastronomic preferences in this scenario. Since human language is complex, people may use a variety of terminology to describe a concept, making it difficult to extract user preferences. As a result, sentiment analysis should use a semantic approach. People are sometimes perplexed as to which restaurant is best suited to their preferences as the number of eateries grows. People also have a hard time deciding where to eat and what cuisine to order, especially if they are new to the region. A web-based restaurant suggestion system called "Restaurant Recommendation System based on Machine Learning." The model's main goal is to recommend the best cuisine to eat at a specific place based on the users' culinary preferences. The system is aimed at users who want to dine at a restaurant. The program considers the users' meal preferences and ratings while making food recommendations. The program uses techniques like Random Forest, Random Forest with PCA, Density-based clustering, and K-Nearest Neighbour algorithms to give accurate and trustworthy content-based recommendations to users. The software gathers user feedback on a variety of culinary items and keeps it in a database. The program then makes recommendations to users based on their ratings.

The data collected from the Kaggle website is taken as a source of data for our dataset for the evaluation of the suggested recommender system. It consists of real time data about the restaurant's details located in different locations in Bangalore. The web application uses real time data collected in dataset for prediction of restaurants that actually exists in Bangalore as per Zomato records. The end

results are highly accurate that suggest to a user their preferred restaurants. The contributions are as follows:

- The sentimental analysis is required to suggest a model for analyzing end users' opinions to get user preferences. The accuracy of examining each user's comments to extract user preferences is significantly greater than other approaches.

- To boost the accuracy of collecting users' predilection, a technique that follows the semantic approach is used to group comments by their names.

- In order to propose a new system, there is a need for a relevant and accurate dataset. The dataset is obtained from the Kaggle website.

II. Related Work

In an existing system, a restaurant recommender system that is limited to the mobile environment uses only user location and restaurant previously visited history of the user to recommend the restaurants [1].

In a Hotel recommendation-based system that uses locations around the user to recommend restaurants, POIs databases are taken into consideration while predicting, similarities are computed between users' preferences and hotels in surrounding locations. recommends top-k hotels to the user [2].

The existing suggested method uses Location, Time, and Preference for a recommendation. where the recommendation score is computed considering various parameters such as end-users visiting trends, their taste of food, type of food, type of restaurant, restaurant operation timings, and distance from users' location. [3].

The Location-Based Mobile Environments recommender system uses foursquare data for recommendation where the location of the user was extracted from four data points located around the user. [4].

Another location-based recommendation system that learns from Facebook comments and check-ins to track users' location and suggest users' how far they can travel by generating social-based trends to recommend the restaurants. [5].

Baidu map cloud service technique is implemented along with the recommender system to recommend restaurants to the new users in order to find the required restaurants of their choice which include features like location and cuisines. This system has less user involvement that would notify the user based on their movements and recommend restaurants [13].

III. Implementation

The front-end page is a user-friendly GUI that consists of login and register options to find preferred restaurants. The end-user will be recommended with the top 5 restaurants by considering the similarity in attributes and users' preferences. The system is more effective as recommendations are done using both collaborative and content-based. The closest restaurants could be suggested to the Consumer. The recommendation module turns into active, retrieving close by and eating places and rating them, primarily based totally on their properties, in line with the rankings generated.

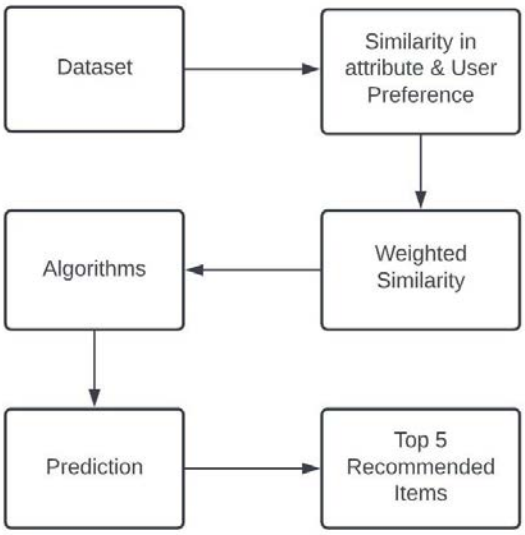

Figure 1: Methodology

Data is reviewed to see how much information we can gain from restaurant reviews. Various algorithms such as Random Forrest, K-means clustering, and hierarchical clustering were applied. And found that KNN method provided better results for building a model of user experience.

A. *Data set*

To suggest a recommendation model for users, a real time data which actually exists in a locality is needed for a web application. The Working dataset, collected in real time, contains user restaurant review ratings, restaurant ids, customers, location information, etc. The text from the restaurant review was analyzed by extracting usable features for developing a classification model which is obtained from Kaggle.

B. *Tools*

For data pre-processing, Jupyter Notebook was utilized, which is commonly used for text data processing. For front-end development, we used HTML and CSS.

C. *Methodology*

First, the data was processed to link users to reviews and reviews to businesses. The non-restaurant businesses were dropped from the dataset. The reviews were observed to see the maximum information that can be gained from a particular user.

- 51% of restaurants have ratings of more than 4.
- 44% of restaurants have 3-4 ratings
- Restaurants have 2-3 ratings less than 5%.

First, the data was analyzed to connect individuals to reviews. As a second step, the evaluations were examined to extract the required information for a specific user. Then, as a trial-and-error procedure, we employed several methods such as Random Forrest, K-means clustering, hierarchical clustering, and Random Forrest with PCA to observe the model's behavior. As our final algorithm, we examined the KNN technique. The application can be accessed from anywhere with an internet connection and is feasible to optimize when needed.

D. *Feature Selection*

Dimensionality reduction has been done with deep knowledge and an in-depth study of the proposed system.

Columns that are dropped are as follows:

- Name
- Place
- Rate
- Favorite Dish
- Reviews
- Type
- City

The columns appear to be significant, yet all of the same information may be found in less sophisticated columns.

E. Algorithms Used

Random Forest: As Random Forest is the simplest algorithm to implement, so Random Forest was the approach used as part of trial and error in model deployment, the model was trained and tested but the outcome expected was overfitting. Furthermore, the expected results were not matched hence proceeded with random future reduction using PCA [6].

Random Forest with PCA: The Principal Component Analysis approach, which detects the hyper-plane nearest to the data and projects it onto it, is the most used dimensionality reduction algorithm. The limitation here is that to select the best hyperplane with the least amount of information loss, we must maintain the greatest degree of variation. [6].

Hierarchical Clustering: This approach has a useful way of clustering using segmented observations that outputs the optimal number of groups falling under particular categories. The optimal groups of restaurants were determined, with no need for a pre-defining number of clusters that stands as a bonus over K-Means [7].

K-Means Clustering: To minimize the number of clusters and clumsiness in the model. K-means clustering is used where each cluster is assigned a data point (k) and the centroids for clusters are located. The cost of restaurant items is computed using the model K-means algorithm. [10].

Density-Based Clustering: DBSCAN can discover the cluster with outliers as well as arbitrary-shaped clusters. The concept of DBSCAN is that a point belongs to the same cluster where other points are nearer to that same cluster. It is also slower in comparison owing to the neighborhood query for each item, and it has problems appropriately establishing the density threshold. [12].

K-Nearest Neighbour Algorithm: The Algorithm is a classification system that learns based on how similar a data point is to other data points. Because of its simplicity and precision, it has become one of the most well-known classification algorithms in the business. In K-NN, K is the number of nearest neighbors. The most crucial deciding element is the number of neighbors. The KNN algorithm predicts the values of new data points based on 'feature similarity.' This means that a value is assigned to the new point depending on how closely it resembles the points in the training set.

The KNN algorithm predicts the restaurants based on the cosine similarity. That would recommend the top 5 restaurants based on users' food predilections. [10].

IV. RESULTS

A. Exploratory Data Analysis

Deeper data visualization is performed on the dataset and obtained the following visualizations

- Number of restaurants providing Online orders

- Most famous restaurants chain
- Type of Service provided by the restaurant
- Favorite food counts
- Cost of booking tables in restaurants

1) Number of restaurants providing Online orders

Most of the restaurants provide an online order facility as people in Bangalore often order food online. The restaurants that do not provide online orders are rated very low compared to restaurants that provide online orders which are highly rated.

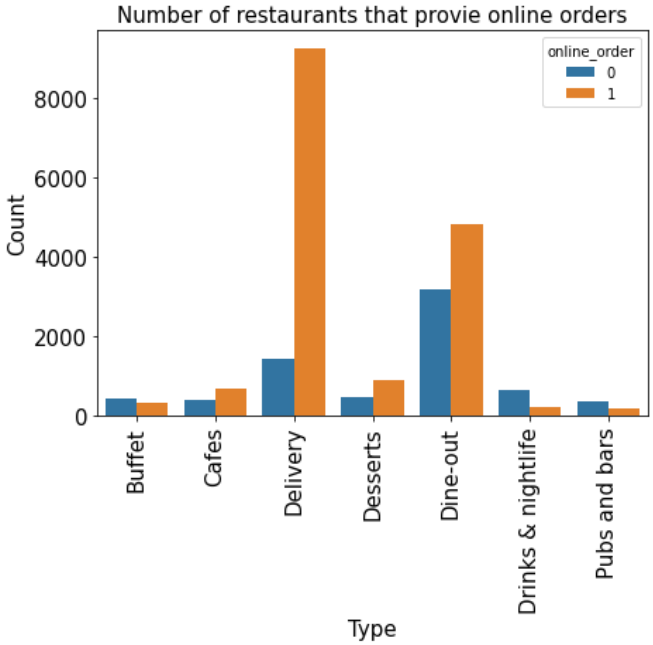

Figure 2: Number of restaurants providing online orders

2) Most famous restaurants

The list of most famous restaurants visited by customers is shown in Figure 3.

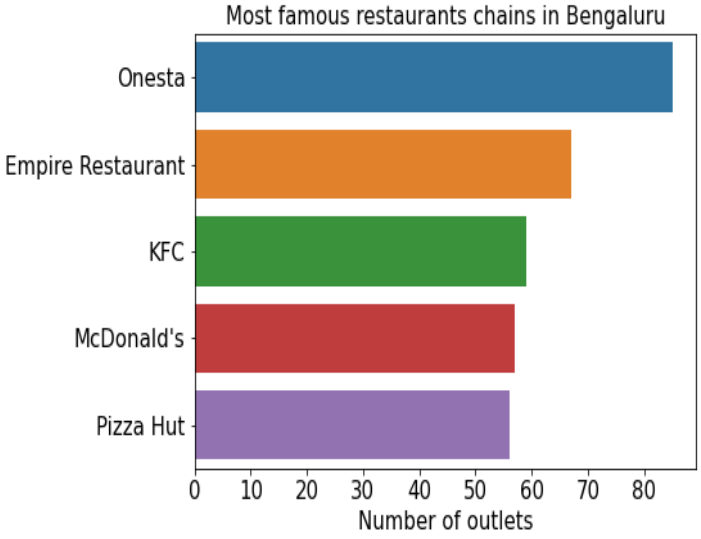

Figure 3: Most famous restaurants

3) Type of Service provided by the restaurant

We can observe that more than 10,000 restaurants provide delivery and up to 8,000 restaurants provide Dine-out services across Bangalore that as listed in Zomato dataset. Most restaurants focus on providing quality over quantity types of services.

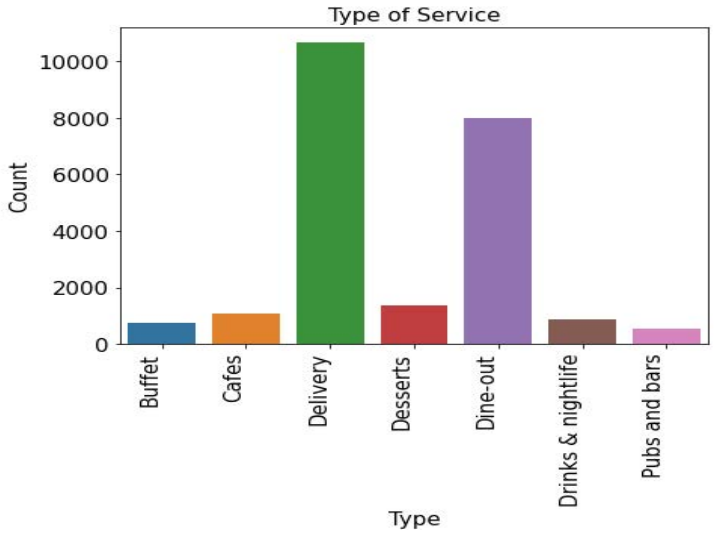

Figure 4: Type of Service provided by the restaurant

4) Favorite food counts

The majority of individuals wish to eat pasta, pizza, and cocktails in Bangalore. Most restaurants serve food-supported customer reviews so as to make customers to revisit their restaurants and create profits.

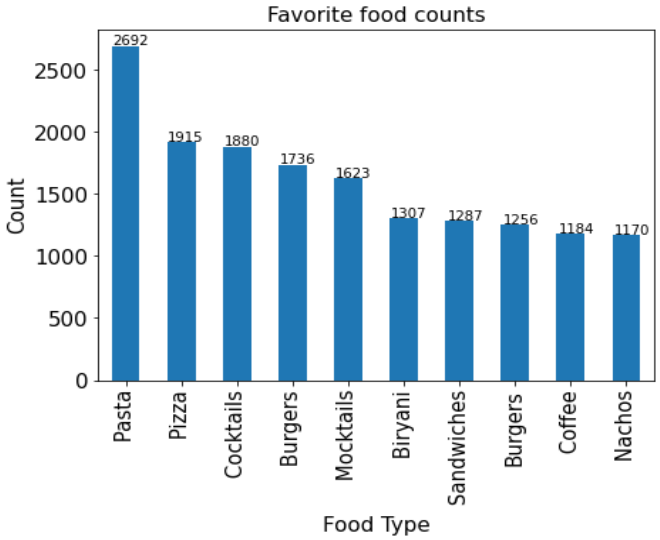

Figure 5: Favorite food counts

5) Cost of booking tables in restaurants

The average cost of the food is greater than ₹1000 for restaurants where the bookings were done online. Whereas the average cost of the food is lesser than ₹1000 for restaurants where the bookings were not done.

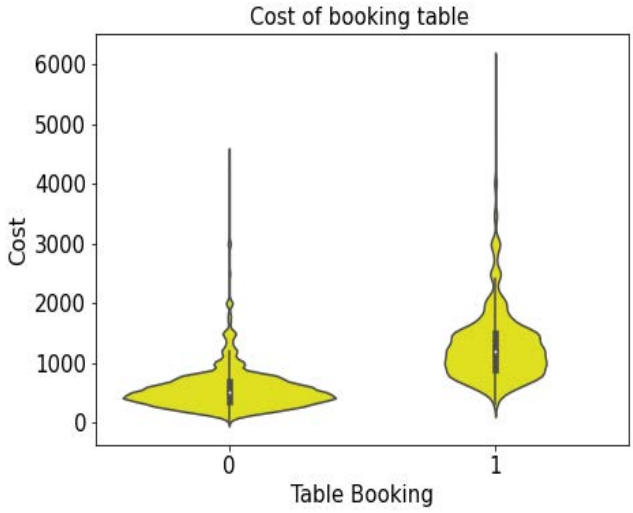

Figure 6: Cost of booking tables in restaurants

B. *UI-UX design*

Figure 7: Front Page

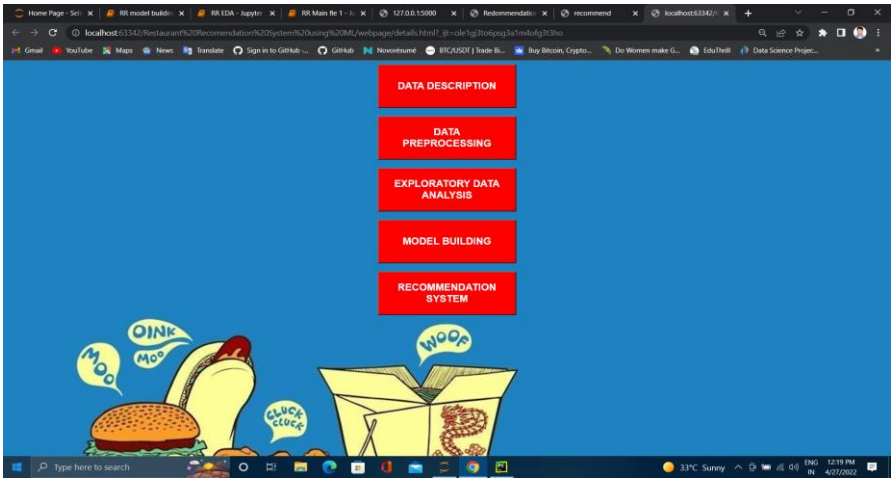

Figure 8: Model linkage page

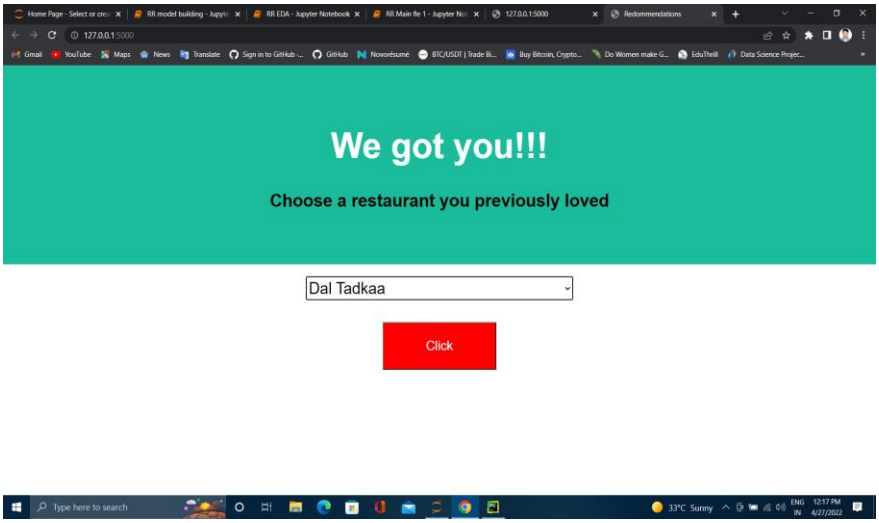

Figure 9: User selection page

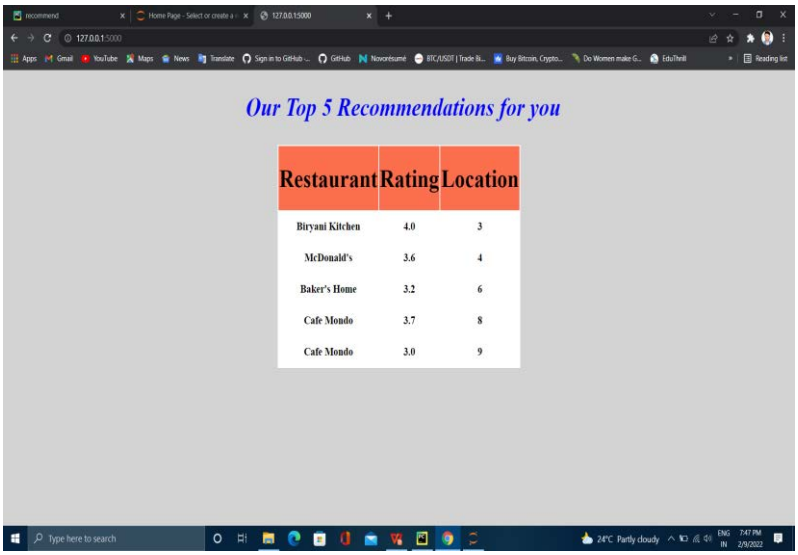

Figure 10: Recommendation page

C. *Inference Table*

Algorithm	**Insights**
Random Forest	The random forest model is overfitting
Random Forest with PCA	We got a good model after feature reduction with PCA.
K-Means clustering	Most restaurants are grouped under clusters, with average cost and average votes determined.
Hierarchical clustering	Determined and linked an optimal number of clusters.
Density-based Clustering	Outliers identified are determined.

K nearest neighbors	Top 5 Recommendations for users based on user preference using cosine similarity.

V. Conclusion

The model developed in this paper analyses the vast amount of data and provides the user with the top 5 recommendations based on the user's choice, considering restaurant type, ratings, and location. This model could be potentially very useful for a food lover to visit a good restaurant based on his\her choice. Hence Machine Learning techniques are used to implement the model. Thus, the complexity of finding good restaurants was significantly reduced as this model will recommend the top 5 restaurants. The current model was tested on Zomato data available on Kaggle and was found 96.7% accurate.

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Carpooling System

Shivani Saha[1], S.Nikhitha[2], Tanuja K[3]

School of CSE REVA University R18CS399@cit.reva.edu.in[1], School of CSE REVA University R18CS374@cit.reva.edu.in[2], School of CSE REVA University Mail:k.tanuja@reva.edu.in[3]

Abstract

People would rather travel in their cars than take public transportation. Traveling alone increases individual fuel costs, traffic, pollution, and other issues. As a solution to the problem, car sharing is proposed. Users will be able to see if vehicles are available for carpooling in their desired route by using the web application, and they can sign up for it. Traveling with different people is also a consideration because safety is an important factor in all aspects of life. Women, for example, do not feel safe traveling with strangers[3]. As a security measure, the carpooling system will also provide rides for only women, as well as a face recognition feature and a Google Map API that will show the exact time required to arrive at a specific location[1]. Carpooling has evolved into a practical, cost-effective, and stress-free mode of transportation. The server is built with powerful JavaScript, PHP, MySql, CSS, and other technologies. The website is intended to be scalable, extensible, highly available, and fast.

Keywords—Carpooling, ride, administrator, trips, feedback, departure, arrival, tracking, and notifications.

1. INTRODUCTION

According to future population projections, India's population will reach nearly 1.5 billion by 2030. Because of the growing population and their transportation needs, transportation has become a major issue in recent years. Private vehicles are one of the most common modes of road transport, but they are rarely used to their full seating capacity. As a result, carbon emissions, traffic jams, increased parking garage, time waste, higher travel costs, and a variety of other issues have increased substantially. Carpooling is a concept that comes into play to overcome or find an accurate solution for this. Carpooling (also known as ride-sharing in the United States) refers to a group of people traveling in a single-vehicle. This necessitates the identification of groups of people traveling in similar ways at similar times. Carpooling attempts to lower the cost of ordinary passenger transportation, not only saving money but also minimizing the use of our most significant carbon-based resource, gasoline, which is quickly disappearing.

As a result, the website can assist you in seeing individuals and trip schedules and deciding if you want to travel alone or save money by travelling with such a reliable business[3]. Furthermore, carpooling has been shown to have social and environmental benefits, such

as lowering the number of miles driven by a specific vehicle and the amount of gas emitted by the vehicle. This will also reduce the amount of cars on road. Reduced parking requirements result in more efficient land use[4]. As a result, the cost of building and maintaining infrastructure is reduced.

This website includes advanced features to make it more user-friendly.

- Instant notifications to car owners and passengers, such as when a passenger book a trip or when a trip booking is confirmed.
- The ability to provide a different price for different distances. A unique dashboard for car owners and passengers on recent rides.
- Google Map integration for location tracking[1].
- Passengers can provide Car Owners with ratings and reviews[2].
- Password changing
- Generation of a full-fledged route map, including from and to locations, departure and arrival times, and total expected time to reach the destination.
- Complete trip history for car owners and passengers to keep track of their travel.

Car-sharing services Global economic development is growing, and it is altering people's attitudes towards owning a car. By 2026, 68 percent of respondents anticipate ride-sharing will outnumber privately owned cars.

2. LITERATURE REVIEW

Fu-shiung [1] the objective of this research is to identify a good match between the consumer and the driver, based upon their respective trajectories. In this approach, intuitive techniques were used to tackle the carpooling problem; these ways are used for "searching and a matching algorithm" was used to assign passengers to drivers' cars depending upon their paths. It was built using both a mobile platform and a Google API. The system was used to reduce distance using a matching algorithm and a variety of strategies.

“Avila Antao and Venisha Correia"[2] they presented an Android app that lets users interact with one another. They provided a number of filtering options for locating a suitable driver or ride from their database of applicants. This software just offers the most basic ridesharing services, such as trip creation, ridesharing, user reviews, communication, and easy methods to sift through all of the possible trips.

“Swati.R.Tare and Neha B.Khalate”[3] - This article suggests a ridesharing app with a geolocation monitoring function. They used Google Maps for position tracking in their app, which may be used to transmit the current location of the automobile to passengers.
To make other users' security and trustworthiness better, they utilized a remark and rating system. In their article, they designed a client-server architecture with data kept in a centralised database. They also contained a number of female passenger security features.
“Raza Hasan” [4] The author introduced the smart peer carpooling system (SPCPS) in this

study, which employs the linear programming problem to reduce the number of automobiles while improving parking slot areas. It also uses the Dijkstra method to identify the shortest path. The optimal solution is determined using the Dijkstra method in this work. The article proposes the smart peer carpooling system (SPCPS), which is efficient in terms of fuel use and contributes to the improvement of socialism.
The software requirements for the implementation of this project are given in table 1.

Software Requirements	
Database	MySQL
Frontend	HTML5,CSS3,JavaScript
Backend	PHP
Apache, XAMP server for MySQL	

Table1: Software Requirements

3. PROPOSED METHOD

The ridesharing system is an innovative system that is based on two primary data sources: route announcements from the driver and path selection and registration from customers. When a user decides to go by car, he or she will provide the origin, destination, and route. He'll go over the vehicle's capabilities as well[2]. The person who discovers the path (passenger). Signing up for the trip is straightforward. A detailed phased registration process for carpooling is included in the technology. To maintain security and confidence, the system would request any recognised identification verification, such as an Aadhaar number or personal account number (PAN card) supplied by the government.

Initially, the user must fill out all needed fields on the registration form. After the user touches the submit button, the username is confirmed. Based on the user's route details, the carpooling system will get relevant information from the database. Our system will collect feedback from customers about their holiday experiences. Women seeking a ride may filter by "Female drivers," which will not only encourage more women to use this system[3]. The registration is complete once all of these verifications have been performed. Enter your username and password to log in to the system, then submit, verify, and grant access. The corporate employee can browse the available carpools after successfully entering into the system. He can join an existing carpool.

The dataset was obtained from github and contains all of the customer's information[8].

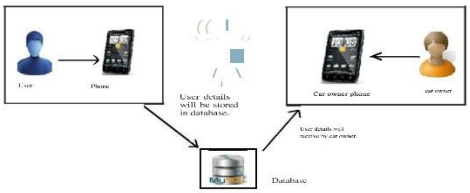

Figure1: System Architecture

System Implementation

Login

It is important that all three users (car owner, customer, and administrator) are properly registered; they may do so by filling out their appropriate credentials in the user logins (user name & password).

Module 1

Car Owner :

A vehicle owner is someone who owns a car and wishes to drive from one location to some other location. He advertises his journey on this website in the hopes of finding passengers to share the ride with.

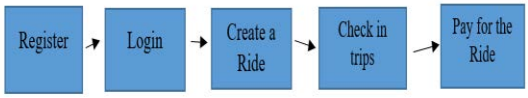

Figure 2: Module 1 block diagram.

a) Scheduling Rides: The website prompts the rider's information, which includes the endpoint, origin, gathering location, arrival date, estimated time of arrival, and travel preferences.

   Once providing this relevant information, the car owner shares it to locate customers.

b) Check-in trip: The car owner or passenger can check-in at the meeting site when he arrives at the agreed-upon time.

c) Payment: The expense of the ride will be paid by the passenger.

Module 2

Passenger:-

A passenger is a someone who does not own a car but wishes to go with a rider. All of the terms and conditions are posted by the traveler, and he/she agrees to them.

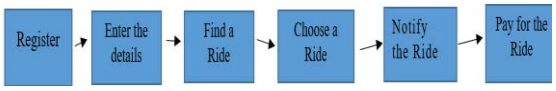

Figure 3: Module 2 block diagram

a) Seek a Ride: If a passenger wants to find a rider for a specific journey, he can use a search feature that asks for the endpoint, startpoint, and travel dates.
b) Choose a ride: Once he has found a suitable excursion, he may quickly make a reservation.

c) Notify the Ride: The application notifies the car owner.

d) Payment for the ride: The expense of the ride will be paid by the passenger.

Module 3

Admin:-

The administrator can keep a record of the journeys that have been scheduled.

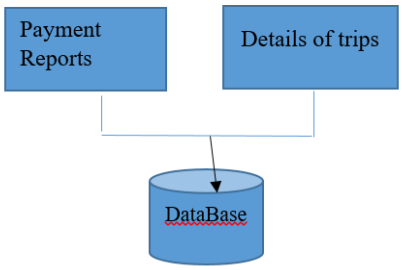

Figure 4: Module 3 block diagram.

a) Payment reports: The administrator will have access to the payment transaction records and will be able to manage them.

b) Details of Trips: The administrator can keep a record of the journeys that have been scheduled.

Working Model

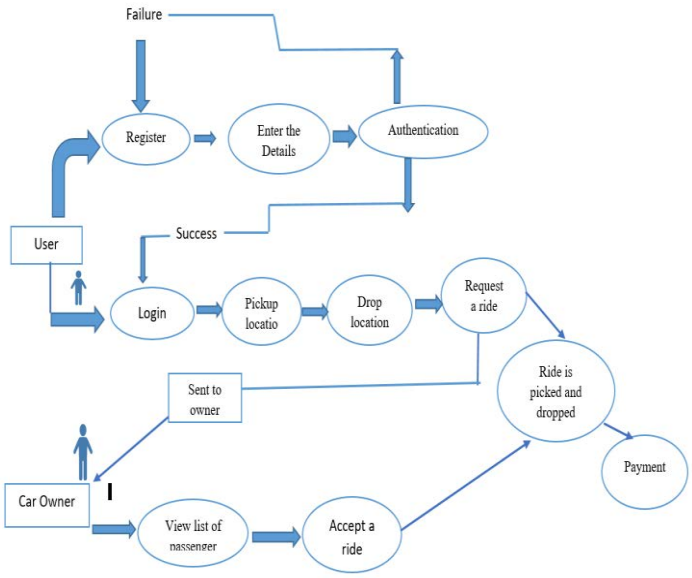

Figure5: Use Case Diagram for Working Model

4. RESULT

Carpooling programmes are intended to encourage ridesharing by matching riders with similar origins and destinations. The software is written in Javascript with CSS as the front end and PHP as the back end in a Windows environment. The software achieves the following goals: instant access, increased productivity. Optimal resource utilization, effective record management; operations are being simplified, less processing time and obtaining required details, user-friendly and portable and adaptable for future development.

Figure6 : Login Form.

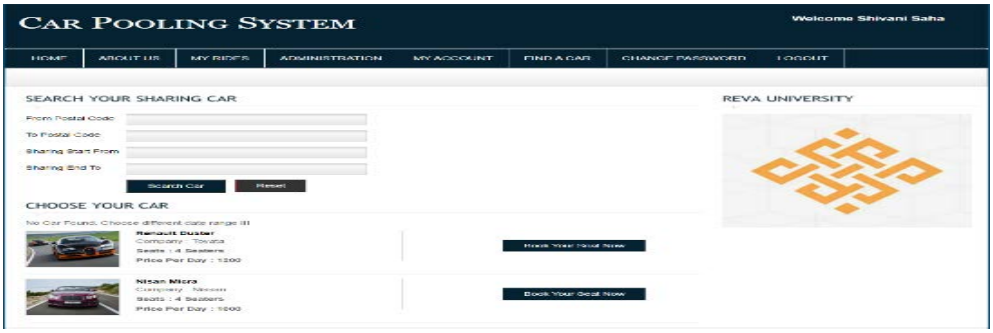

Figure 7: Find a ride section.

5. CONCLUSION

Ridesharing is an extremely effective method of reducing pollution and vehicle congestion in cities. It is also an environmentally friendly mode of transportation. This also gives you the chance to interact new individuals. Because of the delays created by public transit and the pleasures given by private vehicles, most individuals nowadays choose to travel by private vehicle. Pre-registration ensures that only individuals who have been identified enter the vehicle, allowing trust to be established. As a result, the suggested ridesharing system will aid in the reduction of environmental pollution. It will also ensure the safety of citizens. This will provide you with an exact pick-up time.

6. FUTURE ENHANCEMENTS

The system's advantages are numerous, including reducing road congestion, fuel efficiency, and air pollution, among others. A sharing payment system or a redeemable points system might be created in the future to further promote pooling payment systems or redeemable points systems.

The future situation must include the progress of self-propelled cars as well as potential uses that might have a substantial impact on carpooling. Two developing technologies will

revolutionise the transportation market: self-driving vehicles and dynamic congestion charges. The influence of self-driving cars on ridesharing is connected to the fact that, in the absence of a driver, the vehicle must coordinate possible directions and arrange all ridesharing matches on a real-time basis (that is, while the car is already running) and alter its route accordingly. Accepting a ride request when the car is already driving might be unprofessional or dangerous. The self-driving car always has a trustworthy and safe carpool driver, and the charges are immediately charged.

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A Novel robust Hrudaya Rakshaka gadget for early Prediction & Detection of Heart Attack using ML-AI

Alekhya M K[1], Sowmya S[2]

Authors affiliation, alekhyamk4@gmail.com[1], sowmyasudhan.s@reva.edu.in[2]

Abstract.

A benchmark for subsequent evolution prediction and non-invasive HEART ATTACK detection is an effective non- invasive heart attack diagnosis. In this work, ml algorithms and ai are used to compare and analyse the outcomes of antigen responses for Heart Attack. The heart is incredibly crucial in living creatures. Because a slight error might result in exhaustion or death, heart- related illnesses require greater accuracy, thoroughness, and correctness in diagnosis and prognosis. There are numerous occurrences of cardio deaths, and the number is steadily increasing.

Keywords. Heart Attack, Biomedical Gadget, Machine Learning, Artificial Intelligence.

1. INTRODUCTION

Because the cardiac is one of the most vital systems in the human body, it requires special care. Today, heart disease remains the leading cause of death worldwide, notably in India. Forecasting this is a vital requirement for the health sector of the country to improve. Heart disease predictions can be made withthe help of an ECG and clinical data. According to the Globe Heath Data 2012 report, almost one in every three people in the world has high cholesterol, which is responsible for roughly half of all deaths. One of the most accurate method innovations is machine learning, which is also based on training and validation. Machine learning is a branch of Ai Technology (AI), and it is one of the most often used learning methods in which bots imitate human abilities. Among the most accurate method technologies is machine learning, which would be focused on training and testing. Machine learning is a branch of Artificial Intelligence (AI) that is one of the most comprehensive learning domains in which bots imitate human abilities. ML algorithms, on either hand, are taught to process and utilize data, hence why Machine Intelligence refers to the fusion of two technologies.

2. LITERATURSE SURVEY

Maria Sultana Keya, Minhaz Uddin Emon Faruq Hossain, Muhammad Shamsojjaman, Farzana Akter, Fakrul Islam, - “Measuring the Heart AttackPossibility using Different Types of Machine Learning Algorithms” [1] - They've worked on a variety of machine learning techniques for predicting heart attack risk, including logistic regression,decision tree, random forest, and bagging, MLP . This work displays correlation matrices, visualises the feature, and calculates AUC by determining the optimum algorithm. It is clear from this research that regression analysis is the best model, with an efficiency of around 80% and an AUC of around 87 percent.

Sushmitha R - “Soft set and Fuzzy Rules enabled SVM Approach for Heart Attack Risk Classification among Adolescents” [2] - This study focuses on detecting and classifying heart attack risk in teenagers by providing a novel architecture that uses fuzzy rules and soft set theory to detect and classify heart attack risks in the early stages. The new structure is found to perform well on numerous aspects, including accuracy, latency, and efficiency.

Suma Swamy, Salma Banu N.K, - “Prediction of Heart Disease at early stage using Data Mining and Big Data Analytics: A Survey” [3] - The different methods of data (DM) algorithms for heart attack prediction are reviewed in this research. From 2004 to 2016, this document gives a fast and easy overview and comprehension of available data mining prediction models. The table compares the accuracy of each model as reported by several researchers.

Apoorv S Kulkarni ,Shrey S Kothavade, Dhananjay Patel, Aditya D Sawant, - “A Review on Prediction of Early Heart Attack Based on Degradation of Graphene Oxide and Carbon Nanotube using Myeloperoxidase” [5] The link among Graphene Oxide and Myeloperoxidase (MPO) Graphene Oxide is investigated in this paper, as well as the relationship between MPO and Nano - tubes (CNT). Toxicology, spectroscopy, and zeta potential should all be checked. The research presents a detailed investigation on detecting elevated MPO levels in order to discover elevated cholesterol levels in the human body, which can lead to heart health difficulties in everyday life. The identification of MPO using many approaches studied in this research can help with early heart attack diagnosis.

"Pankaj Kumar" [6] - Prince Kansal, Himanshu Arya, Aditya Methaila, Himanshu Arya Pankaj Kumar. To forecast cardiac illness, researchers will employ data mining categorization modelling tools such Decision Trees, Neural Network (nn), Nave Bayes, as well as the obligable Method and MAFIA algorithm. It can detect the risk of heart disease in individuals based on medical factors such age, gender, heart rate, and sugar levels.

D. K. Ravish, Nayana R Shenoy , Dr.K.J.Shanthi, S.Nisargh - “Heart Function Monitoring, Prediction and Prevention of Heart Attacks: Using Artificial Neural Networks” [7] - In this research, we chose the ANN with all of the features assessed, as well as employing a genetic approach to evaluate crucial clinical features using its fitness function. The ga looks at four key characteristics to judge whether or not a person is healthy.

M.Snehith Raja, NageswaraRao Sirisala, M.Anurag, Ch.Prachetan Reddy - “MACHINE LEARNING BASED HEART DISEASE PREDICTION SYSTEM” [8] - In this study, the Random Forest algorithm, a strong Machine Learning tool, is employed to build a reliable heart disease prediction method. This command reads data from a CSV file including patient records. After receiving the dataset, the procedure is carried out, and a suitable cardiopulmonary arrest grade is generated. The following are the benefits of the suggested system: It is extremely efficient and accurate, as well as very versatile and successful.

M. Raihan, Md. Omar Faruqe Sagor, Arun More, Saikat Mondal - “Smartphone Based Ischemic Heart Disease (Heart Attack) Risk Prediction using Clinical Data and Data Mining Approaches, a Prototype Design” [9] - A smartphone was utilised in this study to develop a simple model for estimating the likelihood of developing an infarction heart diseases (IHD) (Heart Attack). Clinical data from IHD patients admitted to hospitals was used to develop an Android-based prototype application. The medical evidence of 787 patients was analysed and risk factors such

as heart rate, diabetes, cholesterol (excessive lipid), smoking, family background, obesity, stress, and current clinical symptoms were identified.

Mateo Mejia-Herrera, Juan Botero-Valencia, David Marquez-Viloria, - "Presentation Attack Detection using Heart Rate from Amplified Color Videos and Pulse Oximeter Information" [10] - This study describes a method that uses Iterative Optical Magnification algorithms to detect vitality in amplified colour videos using heart rate pulses. A pulse oximeter activates the system, and the collected data is matched to the data collected from the videos. The results of such a test are used to assess the vitality status of the sample. According to the testing results, the highest divergence between the film and the blood oxygen data does not exceed ten times a minute (BPM), with a mean of 4.466 **BPM.**DATA SET DESCRIPTION

A defined as information on cardiovascular disorders acquired from cardia attack by creating and isolating changes In cardio attack components like ECG, ANIGOGRAM to use a NON-INVASIVE gadget that spins at various rates to establish the fundamental structure of various components of HEART ATTACK.

3. PROPOSED MODEL

In this paper, we take another step forward in developing an A.i. for MI detection & quantization that can gain experience. The proposed AI model is split into 2 sections: a Convolutional Neural Network (CNN) and a Stochastic Separation Theorem-based error correction component (SST). During the first detection, we employed CNN because of its well-documented strong performance in a variety of domains, such object classification and patter recognition. However, no matter how thoroughly a data-driven Ai system is educated, it will make mistakes. Data distortion, insufficient training, or misinterpretation in empirical data can all lead to errors. As a result, we added error correction to the core Ai (a CNN), enabling us to great its efficiency on the go. AI error correction strives to reduce AI acceptability difficulties in healthcare applications because AI aims to fill the gap among human and machine abilities.

A) CONVOLUTIONAL NEURAL NETWORK (CNN)

The convolution layer is the foundation of the CNN (CL). CL employs a series of convolution to an input, performing dot product actions (conv) on each filter and patching the input over pictures for each filter. Assume that the number of input is HiWiDi, where W for input width, in H stands for intake height, D for intake depth, and I for layer index. The filters are F in height and width, S in leg length, and P in padded size. The i-th CL then creates a feature map of size Hi+1 x Wi+1 x Di+1, with Hi+1 = (Hi-F+2P)/S+1, Wi+1 = (Wi-F+2P)/S+1, and Di+1 the number of filters.

CLs often route keypoints (or their regular mixes) over a Rectangular Transport Units (ReLU) layer to incorporate and account for non-linear relationships between distinct features. ReLU(u) = max0,u is a basic nonlinear operation performed by each element of the ReLU level on its input u. ReLU functions may both approximate and operate as continuous cutoff valves, making them excellent for computing solutions to boundary problems

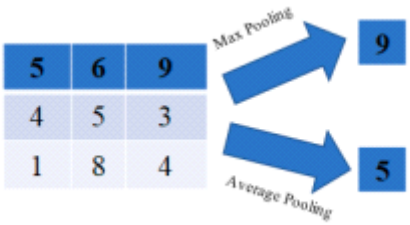

Fig. 1 showing max pooling and average pooling

Fully connected layer: In this , neurons possess effect of contact time to all signals in the previous layer, similar to a traditional artificial neural network.

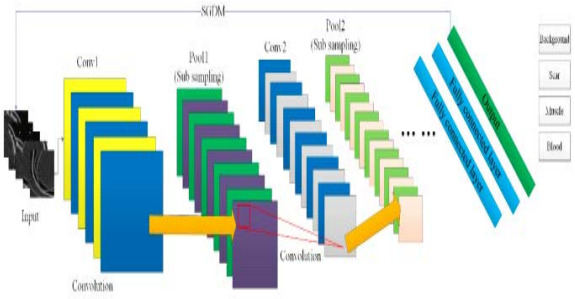

Fig. 2 SGDM

B) ERROR CORRECTION

An activity that designs and layout items to outputs is what makes up a general AI system. The inputs are MRI images, and the results are pixel labels placed in relevant areas of the images. The inputs of the AI system are given by u € U, the outcomes by q € Q, and the internal state of the AI system by z € Z. As a result, the entire Intelligence system is characterised as a triangular zone (u, z, q). Each trio (u, z, q) is linked by a piece x € Rn (u, z, q). For example, x may be a graph depicting the j-th stage's outcome. We assume that components x are generated automatically (u, z, q)

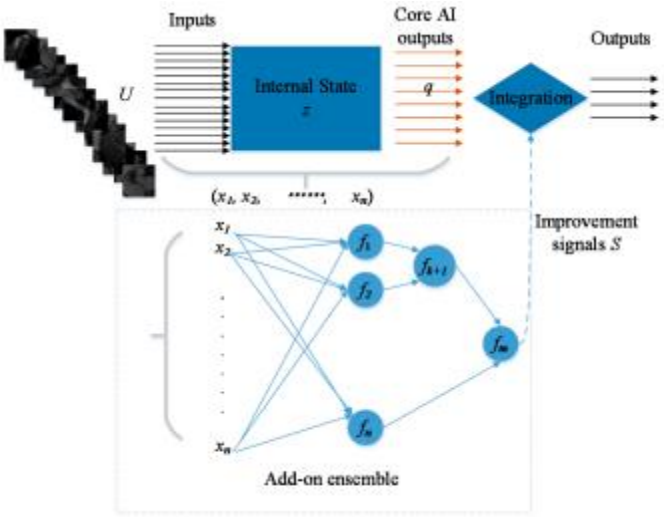

Fig 3. Error correction

C) HEARTBEAT DETECTION

A Fourier band-pass filtering (2-30 Hz) is used to reduce background wander and powerline noise from the obtained ear-ECG stream. Then, using 10 previously analysed features that are tolerant of severe motion artefacts, a Classifier is trained [13]. The S wave slope, R wave angle, R-to-S Δp, R wave symmetry, S waves symmetry, variance, skewness, slop readings and roots mean square, at the third and second samples preceding and after the R peak, respectively, are among these characteristics. Motion artefacts are still present in the recognised raw heartbeats, particularly during the added head movements.

D) HEARTBEAT PURIFICATION

We also show how to improve robustness by using unconstrained ml algorithms to select the ecg Signals heartbeats. Using a high-quality heartbeat template, we use a system's dynamic distortion (DTW) technique to analyse the damaged state of each raw ECG pulse. The altered number of each ECG pulse is evaluated to a specified threshold to create the heartbeat quality index. Following that, these binary quality indexes are used to purify the raw ECG heartbeats. This filtering step occurs in the second minute of each trail and is used to exclude message sections that are substantially influenced by head motion.

E) QRS DURATION PREDICTION

The DTW technique may recognise the QRS boundaries when creating raw heartbeat-specific distorted values by comparing the QRS lag and start in the pattern to each raw heartbeat. As a result, the QRS boundaries are identified simultaneously with the purified ECG heartbeats. The ear-ECG QRS duration, on the other hand, is calculated using a different body position than the chest region. To complete the calibration, the ear-ECG QRS duration estimations must be calibrated to obtain the normal chest-ECG QRS time

the bias factor in a simple linear regression model. To forecast the chest-ECG duration, simply a shifting is applied to the ear-ECG QRS duration.

4. RESULTS & DISCUSSION

In this investigation, we got to the result that machine learning techniques outperformed greatly. Several academics have previously stated that we must utilize machine learning when the dataset is tiny since the computing time is lowered, which is advantageous for implementing a system. It was also observed that the information should be standardized; otherwise, the training model could become over fit, resulting in insufficient accuracy when a system is evaluated for real-world data issues that differ dramatically from the data on which it was taught. It was also revealed that when analyzing a dataset with a Gaussian distribution, statistical analysis is critical, as is outlier spotting, which is done to use the Separation Forest technique. The issue is that the sample size for the dataset is quite tiny.

Machine learning (ml) results can be greatly improved when a large dataset is provided. We observed that algorithm we utilised in ANN architecture improved accuracy when compared to other studies. Deep learning, along with a slew of other enhancements, can be used to deliver more promising results when the data size is increased. To improve the study results, machine learning as well as a number of other optimization techniques can be used. The results can be compared after the data has been normalised in various ways. There are more approaches for including heart issue detection ML using AI on PSoC modelling with customised multimedia for the comfort of patients and clinicians.

5. CONCLUSION

Machine learning (ml) results can be greatly improved when a large dataset is provided. We observed that algorithm we utilized in ANN architecture improved accuracy when compared to other studies. Deep learning, along with a slew of other enhancements, can be used to deliver more promising results when the data size is increased. To improve the study results, machine learning as well as a number of other optimization techniques can be used. The results can be compared after the data has been normalised in various ways. There are more approaches for including heart issue detection ML using AI on PSoC modelling with customized multimedia for the comfort of patients and clinicians.

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Novel Hybrid Model to Detect Autism Spectrum Disorder based on Multiple Screening Data

B C Rupesh Reddy and Dr. Kiran Kumari Patil

School of CSE, REVA University, Bangalore, India
rupeshreddy1029@gmail.com, Kiran.Kumari@reva.edu.in

Abstract

In present day autism spectrum disorder (ASD) is used for spreading its faster when compared to other time. Distinguishing chemical imbalance qualities among screening tests is beyond the top exorbitant and gripping. Chemical imbalance patients face various kinds of difficulties, for example, troubles with focus, learning handicaps, emotional wellness issues, for example, nervousness, gloom and so on, engine challenges, tangible issues and numerous others. With the headway of man-made reasoning and AI (ML), chemical imbalance can be anticipated at very beginning phase. However, number of studies have been completed utilizing various procedures, these investigations gave no authoritative decision about anticipating mental imbalance qualities as far as various age gatherings. Subsequently this paper intends to propose a powerful crossover forecast model in view of ML and DL strategy and to foster a versatile application for anticipating ASD for individuals of all ages. As results of this examination, a mental imbalance forecast model was created by consolidating ML model and Deep Learning model in light of Oral Screening

Keywords. COVID-19, classification, Sentiment Analysis; Topic Modeling; Machine Learning; Deep Learning Natural Language Processing

1. INTRODUCTION

Information mining is viewed as one of the most noticeable fields in software engineering, it intends to find until recently concealed experiences or examples in little, moderate and big datasets in this way prompting improved dynamic cycles in many fields . A few displaying strategies exist in Data Mining as well as relapse, grouping, affiliation rules, bunching, Association Classification (AC), the creators will examine the effect of the AC strategy on improving the dynamic interaction in the Autism Spectrum Disorder (ASD). The AC strategy creates basic and the sky is the limit from there justifiable standards that decidedly affect the exactness of the classifier or on improving the decision making system inside the association; this makes this strategy more appealing for specialists. Nonetheless, the AC strategy has an inconvenience because of the enormous number of affiliation rules it typically creates henceforth requiring extra time and capacity than other, conventional data mining methods.

Besides, a large portion of the AC calculations will generally be impacted by the substance of the datasets to such an extent that it makes the greater part of these calculations act in a shaky manner once applied to various datasets or areas.

It is worth focusing on that the AC method has been sent in various locales or areas; one of the most basic areas that has not yet been examined adequately by analysts is Autism Spectrum Disorder (ASD) which is a "mental health disorder that cut off points correspondence and social ways of behaving" . Instances of clinical determination draws near are "Autism Diagnostic Interview" (ADI) also "Autism Diagnostic Observation Schedule-Revised" (ADOS-R). Then again, and to improve the precision of ASD finding, analysts as of late embraced AI draws near (Bone), approaches in which the accompanying objectives can be accomplished decisively:Further developing grouping exactness.Lessening the transmission time.Distinguishing the negligible number of ASD codes that diminish the intricacy of the issue.

Besides, information mining offers computerized characterization models for ASD that are compelling and productive. These models join a few pursuit calculations from PC science.Analysts have as of late fostered various information digging strategies for the ASD issue, for example support vector machines. ASD finding is viewed as a common information mining arrangement task since we can fabricate a model from recently characterized occurrences. The determination of a new example (ASD, No-ASD) can then be anticipated utilizing this method.

The primary point of this article is to think about seven AC calculations and apply them to a grown-up autism dataset. A exhaustive trial concentrate on utilizing grown-up autism UCI dataset will be introduced to think about and assess well known affiliation arrangement calculations in light of their accuracy, review, precision and F1 measures, this will thusly show the general presentation for such calculations in the autism space. Applicable work to this area is introduced in Areas 2, in the meantime segment 3 covers trial results exhaustively lastly, area 4 is about ends tooas any proposed future work.

Background: Data Congregation and Mining in Medical care (Autism) :

Cell phones, tablets and compact registering gadgets have a connection to soundness of kids in numerous ways: The normal, winning discernment about the effect of these gadgets is that regular utilization and exorbitant utilization of such gadgets sway the personal satisfaction and wellbeing of youngsters in a few, unfavourable ways. These will quite often influence rest quality, affinity for weight, by and large wellness, "outer muscle torment, visual wellbeing, and headache/migraines".investigated the effect of cell phones furthermore, gloomy feelings among Chinese young people by broadening momentum research attesting joins between portable use and cynicism of feelings. The creators expanded ebb and flow research work to examine the "components fundamental" the relationship as well as directing relative investigation of portable consequences for fanatic gatherings versus non-someone who is addicted gatherings. Their work reasoned that juvenile bunches dependent on cell phone utilize a) will generally spend more cash on cell phones and, b) that these gatherings were more helpless to pessimistic inclination.

Autism Spectrum Disorder (ASD) isn't simply connected to youngsters' unnecessary admittance to cell phones, rather that elements like eye to eye connection establish fundamental fixings in the sound development of new born children. This eye to eye connection with guardians (joint consideration) is impacted unfavourably during their distraction with their own cell phones when around their kids, particularly if the kids are as of now inclined toward Autism. Conversely, another, more uncommon impact of portable, advanced gadgets is as instruments utilized by professionals and specialists to quantify the everyday ways of behaving in youngsters. (Jones et al., 2018) used cell phones to give guardians information about youngsters' way of behaving counting nervousness, crabbiness and mind-set varieties. This empowered the proficient social occasion of information with about fourteen days of information assortment with cell phones showing comparable

amount and nature of accumulated information comparable to about two months with customary techniques.

The job of information mining on the side of medical services shifts with the prerequisites and the accessible advancements and additionally with the accessibility of value (and volume) information. Regardless, guardians, clinical specialists and advisors benefit enormously from new advancements around here which offers help to assist with figuring out learning styles as well as give a decent premise to planning custom tailored agendas for initial recognition and mediation arranging . The beyond couple of years have seen the presentation of a few methods indicating to address side effects of Autism Spectrum Disorder (ASD), including procedures that use innovation for screening and restoration. present a survey and investigation of past examinations in this region and order their discoveries into three classes in addition to sub-classes. Their work gives a survey reference of unmistakable methodologies for various innovation based arrangements connected with screening, evaluating and recovery of ASD

2. RELATED WORK

In this part we examine about past commitment done towards ASD. Each paper has utilized different method, calculations, dataset furthermore, anticipated ASD. [1] Benjamin Gesundheit and Joshua Rosenzweig have incorporated the investigation of the ongoing creature models for ASD furthermore, their reasonableness, inspecting, social, immunogenic, and epigenetic research, reconsidering clinical indicative devices. They have taken

12 grown-ups determined to have ASD and age matched controls playing out a visual objective discovery task. [2] Arodami Chorianopoulou, Efthymios Tzinis, Elias Losif, Asimenia Papoulidi, Christina Pasolini and Alexandros Potamianos have explored the level of commitment of kids in connections with their folks. Highlights got from the two members including acoustic, etymological and discourse act highlights are investigated. They have considered the datasets of Video accounts and information marking. They have investigated the assignment of commitment location utilizing video-recorded meetings comprising of communications of normally creating (TD) and ASD youngsters.

[3] Siriwan Sunstrike and Trainee Achelike presents a method to research the conduct factor affiliations, and to group these relations utilizing characterization in light of affiliation (CBA). Their investigations involved genuine patient profiles from two medical clinics in Thailand.

This dataset was ordered by specialists in two kinds: Autism and Pervasive Developmental Disorder-Not in any case Specified (PDD NOS). In this paper a compelling grouping mining called acquainted characterization (AC) has been proposed. The methodology accentuated relations of properties, which varied from customary order techniques. [4] Belbin li, Sachine Mehta, Deepali Anja and Clavier Encourage have acquainted an end-with end AI based framework for ordering autism spectrum disorder (ASD) utilizing facial characteristics like articulations, activity units, excitement and valence. They prepared CNN-based model that takes a facial picture as info and yields four facial credits to be utilized for ASD forecast. They have taken brief audit the current work for facial characteristic acknowledgment also, their application in autism. [5] Pratibha Valenki involved solo learning techniques in this errand. [6] Paul Fergus utilized animation

characters in the versatile application he created to assist youngsters with autism. [7] V. Y Tartaglia utilized eye to eye connection, responsiveness to improvement, examination of vocal personal conduct standards and survey to foresee autism. [8] Daiki Matsumoto utilized the elements of discourse to distinguish autism. [9] Tarentum Zeki utilized detecting keypad to give a simple and adaptable method for association for medically introverted kids. [10] Adriana Sula proposed a framework utilizing JXTA-Overlay Platform in light of distributed correspondence between youngsters, guardians or guardians and advisors and they utilized Smart box alongside sensor for checking and controlling kid's exercises. In any case, utilizing sensors is costly is the significant downside. [11] Haibin Cai, Yinfeng Fang, Zhaorjie Ju and Honghai Liu have proposed a detecting framework that consequently concentrates and breakers tactile elements, for example, body movement highlights, looks, and look highlights, further surveying the youngsters' ways of behaving by planning them to specialist determined social classes. This paper made an endeavor to work on the current frameworks of both norm and robot helped treatment for youngsters with ASD by means of a detecting structure with multi-tangible setup and combination. [13] Sushma Rani Dutta and Sujoy Datta dealt with recognizing primer side effect utilizing cogency and AI where they involved CARMRMR calculation for anticipating next potential side effects via preparing with old side effects which neglected to foresee effectively. [14] Che Zawiyah Che Hasan fostered a framework for recognizing autism spectrum disorder utilizing ANN and SVM classifiers in light of Three-Dimensional ground response powers, here individual people exhibited different proof of development and step

lopsidedness and change in joint energy with awkwardness were seen to foresee autism which neglected to anticipate ASD in all cases.Henceforth, it took a more prominent number of times to analyze the disorder. [15] Bone utilized ADI-R and SRS calculations. The limit was it contained a wide age range dataset (4-55 years). [16] Kos Micki utilized calculated relapse and SVM calculations. The limit was it had a bigger dataset and utilized ADI-R strategy.

3. PROPOSED METHODOLOGY

Our proposed model is consisting of 4 Phases as follows

- Data collection
- Exploratory Data Analysis
- Build The Model
- Train the Model
- Test the Model

A. DATA COLLECTION

Information assortment is the cycle where data accumulated and estimated on factors of interest, it lays out a deliberate style where one solution to an expressed exploration question, test the theory and assesses the results. The informational indexes are gathered to assemble a viable

prescient model. This informational index contains information old enough gathering of multi month to three years. The informational index contains a bunch of inquiries which is utilized to recognize whether the youngster is to be alluded to autism evaluation. We gathered informational collections which contains in excess of 1000 records.

Spaces center around correspondence, age, conduct, and so forth. Thus, we can prepare our model with various circumstances and encounters. Each question can be set apart with 0 or 1. Table 1 describes the dataset

Table 1. Autism Spectrum Dataset features

Name of attribute	Number of values
A1_Score	2
A2_Score	2
A3_Score	2
A4_Score	2
A5_Score	2
A6_Score	2
A7_Score	2
A8_Score	2
A9_Score	2
A10_Score	2
Age	4
Gender	2
Ethnicity	11
Jaundice	2
Autism	2
country_of_res	67
used_app_before	2
Result	4
age_desc	1
Relation	5
class/ASD	2

B. EXPLORATORY DATA ANALYSIS

i)Data Processing:

Information handling are a progression of activities which are performed on information to check, arrange changes, coordinate and concentrate information in an suitable result structure. Strategies for handling should be thoroughly recorded to guarantee the respectability and utility of the information. The information set that we have gathered contains text design in couple of segments, so we initially need to handle this text to mathematical organization. We process the information since we really want every one of the segments of the informational collection to contain a comparative worth so we can assess the dataset all the more effectively. We moreover utilize invalid investigation to check assuming the informational index comprises of any invalid qualities or not. If the dataset contains any invalid worth, it very well may be eliminated utilizing the invalid examination.

ii) Data visualization:

Information representation is a simple method for addressing more complicated information as designs. We plot the charts in view of the dataset present

to find out about which gathering is getting impacted by autism. This assists with breaking down the information gathered. It is utilized to show the

relationship among datasets. In our venture we utilize three charts plotting in view of,

- Yield versus period of month
- Yield versus orientation
- Yield versus hereditary qualities

Information is parted into prime and text design. The main diagram plotting that is the result versus time of month tells us at which age the youngster displays more side effects as per the dataset present so we can take careful step at that specific age. The second diagram plotting that is the result versus orientation lets us know which orientation bunch gets more impacted by autism. The third plotting yield versus

hereditary qualities let us know whether the gathering which had autism in their relative is impacted more or the gathering that had no autism cases previously.

C. BUILD THE MODEL:

In the wake of gathering every one of the fundamental insights regarding the model, we are keen on planning we start the method involved with building the model.

Building the model has a couple of stages where it is done. By building the model it makes it more straightforward to convey about it with the individuals and cause them to comprehend about the working of our prescient model. Our model is intended to anticipate assuming that a kid has autism or not with few highlights. The model acknowledges inputs in the parallel configuration, which gives an unmistakable split between kid with ASD or not. Where 1

addresses positive and 0 addresses negative. And that implies assuming it's a 1 than the kid has no autism assuming its 0 than the youngster has autism. To foster the forecast of autism, the calculations were constructed and their precision was tried.

D. TRAIN THE MODEL:

Preparing the model is a significant stage in ML. the outcome we acquire from the model relies upon how well we train our model. The execution increments with in excess of 1000 records. So, our model is thoroughly prepared with every one of the potential cases. As we have all the more no of patients record the model is prepared well with every one of the information conceivable. We utilize 70% of the dataset to prepare the model.

F. TEST THE MODEL:

In the wake of preparing the model with the informational index, we then can test the model. We select not many arrangements of information and feed the contribution to the

model and check assuming the model is functioning admirably. As we utilize 70% of the dataset to prepare, we utilized the rest 30% to test the model. Where we can

effectively get to be aware in the event that our fabricated model is prepared well or not as we as of now have the forecast to check the result acquired

4. MODEL IMPLEMENTATION

We are involving three calculations for creating forecast model. At first arbitrary woods is considered for characterizing the dataset we have for anticipating autism spectrum disorder, some unacceptable results got from RF we will arrange in the future in SVM with full informational collection, no difference either way missed in RD will be covered her with best outcome. Yet not many wrong results will be anticipated and assuming any off-base info is given result won't be exact so we are consolidating these two calculations with Adaboost which is supporting calculation it will arrange wrong result from past calculation and arrange it accurately. Thus, we will actually want to precisely foresee.

A. RANDOM FOREST FOR PREDICTION MODEL

Irregular woods is a learning technique utilized for arrangement, decline and different spendings. It works by building an aggregate of choice trees at preparing time and yielding the class that is the method of the classes or mean expectation of individual trees. The essential nature of this calculation is that to build a little choice tree with not many boundaries. We can develop some little, frail choice trees equal and afterward join all that to shape a solitary solid student by considering normal outcome from dataset or larger part of result.

For acquiring exactness and to neutralize over-fitting arbitrary backwoods is utilized, here we have parted into two sections i.e., creating arbitrary timberland [2-10] and grouping dataset [11-16]. The calculation fills in as follows:

For each tree in the backwoods, we select a bootstrap test S

(i) Where S means the its bootstrap, we then, at that point, become familiar with a choice tree utilizing a changed choice tree learning calculation.

The calculation is adjusted as follows:

(ii) At every hub of the tree, rather than analyzing all conceivable element parts, we arbitrarily select a few subsets of the

highlights f C F, where F is the arrangement of elements.

(iii) Deciding on which component to part is many times computationally costly part of choice tree learning.

(iv) By limiting the arrangement of elements, we definitely speed the learning of the tree.

ALGORITHM 1: RANDOM FOREST

1. Precondition: A training set S=(x_1,y_2),……., (x_n,y_n), features F and number of trees in forest B,
2. Function RANDOMFOREST(S,F)
3. H ← 0
4. for i in 1,……..,B do
5. S(i) ← A bootstrap sample from S
6. h_i ← RANDOMIZEDTREELEARN ($S^{(i)}$,F)
7. H ← HU{h_i}
8. end for
9. Return H
10. end function
11. function RANDOMIZEDTREELEARN(S,F)
12. At each node:
13. f ← very small subset of F
14. split on best failure in f
15. return The learned tree end function

Fig 1: Random Forest Algorithm

B.SVM

SVM is a directed learning strategy that ganders at information and sorts it into one of two classes. It is a direct model for arrangement and relapse. SVM calculation makes a line or a hyper plane what isolates the information into classes. We plot every information as point in n-dimensional space with specific co-ordinate. At first it will recognize the right hyper-plane and that hyper plane ought to have high edge then, at that point, it will give right arrangement. Then, at that point, we arrange two classes here we have considered two classes i.e., who has ASD and the other one who don't have ASD.

ALGORITHM 2 SUPPORT VECTOR MACHINE

CandidateSV = { closest pair from opposite classes}

1. While there are violating points do
2. Find a violator
3. candidateSV = $U_{candidateSV}$
4. If any $a_p < 0$ due to addition of C to S then
5. candidateSV = candidateSV/p
6. Repeat till all such points are pruned
7. End if
8. End while

Fig 2 SVM

C.ADABOOST

Adaboost is one of supporting calculations; it will help in consolidating different powerless classifiers into a one in number classifier. This calculation

will give us the best result on the grounds that some unacceptable anticipated yields from irregular backwoods and SVM are joined into a weighted total that

addresses the ultimate result of the helped classifier. The singular students can be feeble, however when joined with this the last model

can be demonstrated to unite to a solid student. Adaboost is delicate to loud information and anomalies. It gives serious level of accuracy

ALGORITHM 3: ADABOOST

Given : $(x_1,y_1),\ldots\ldots,(x_m,y_m)$, $x_i \leftarrow X$, $y_i \in Y = \{-1,1\}$.

1. Initialize $D_t(i) = 1/m$
2. For t = 1……..T:
3. Train weak classifier using distribution D_t
4. Get weak hypothesis h_t: $x \rightarrow \{-1,1\}$ with error $\varepsilon_t = \sum_{i:h_t(x_i)\neq y_i} D_t(x_i)$
5. Choose $\alpha_t = 1/2 \log (1-\varepsilon_t/\varepsilon_t)$
6. Update :
7. $D_{t+1}(i) = D_t(i) / z_t = e^{-\alpha_t}$ if instance i is correctly classified or e^{α_t} where z_t is normalization factor
8. Output the final hypothesis: $H(x) = \text{sign} (\sum_{t=1}^{T} \alpha_t h_t(x))$

D.ANN

Various solutions will be given using the latest techniques like deep learning, artificial neural network is implemented to achieved the ASD classification from the dataset. For that, it has used ANN (Artificial Neural Network) techniques as a combination of deep learning and neural networks. To address the problems in web mining challenges such as geo location and time of generated data can be maintained in a separate memory using ANN techniques.

The above figure explains about the LSTM structure which provides four layers for data processing namely input, logical hidden, classification and the output layer. The input layer accepts all the series of data generated from various sources on a large network and it will be accessed by a logical hidden layer. This layer using separate logic to categorize the input data and it will be sending for preprocessing to remove the unwanted things. There are a total of 32 layers are working for this operation and the trained data set will be given to the classification layer. Again, the classical classification techniques are used to find out the time of generated data with its location by deep learning concepts then the output will be given as output to the next layer. Finally, these trained network data has to be given as an input to the RNN system for data accessing purpose repeatedly.

Next level the classified data is taken as a trained input for the second step through a recurrent neural network. Deep learning concepts are used here for classification and it is running in the hidden layer. The time of generated input data has stored as a variable named t and these values will be given as an input for the next level procedures. So different data time intervals can be calculated from the log files and their validity also monitored. Finally, the location of the data which was generated from various sources around the world on the larger network than predicted output will be generated.

5. RESULTS

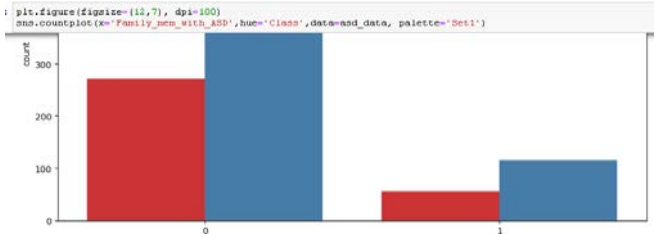


Fig 4: Dataset Analysis

	precision	recall	f1-score	support
0	0.99	0.91	0.95	78
1	0.95	0.99	0.97	133
micro avg	0.96	0.96	0.96	211
macro avg	0.97	0.95	0.96	211
weighted avg	0.96	0.96	0.96	211

FPR and TPR Graph

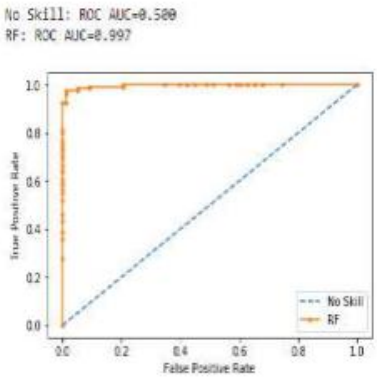


Figure 5 Random Forest

	precision	recall	f1-score	support
0	1.00	1.00	1.00	78
1	1.00	1.00	1.00	133
micro avg	1.00	1.00	1.00	211
macro avg	1.00	1.00	1.00	211
weighted avg	1.00	1.00	1.00	211

FPR and TPR Graph

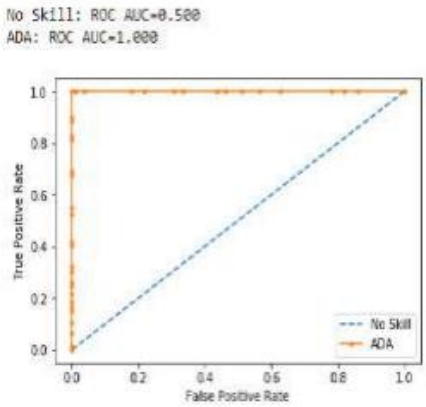
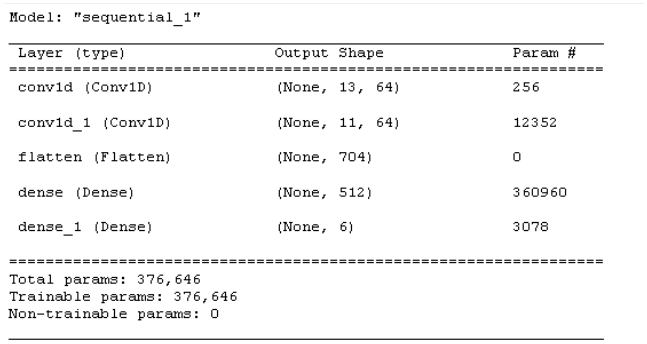


Figure 6: Adaboost

	precision	recall	f1-score	support
0	0.97	0.94	0.95	78
1	0.96	0.98	0.97	133
micro avg	0.97	0.97	0.97	211
macro avg	0.97	0.96	0.96	211
weighted avg	0.97	0.97	0.97	211

Figure 7: SVM



```
Model: "sequential_1"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv1d (Conv1D)             (None, 13, 64)            256

 conv1d_1 (Conv1D)           (None, 11, 64)            12352

 flatten (Flatten)           (None, 704)               0

 dense (Dense)               (None, 512)               360960

 dense_1 (Dense)             (None, 6)                 3078

=================================================================
Total params: 376,646
Trainable params: 376,646
Non-trainable params: 0
_________________________________________________________________
```

Figure 6 ANN Model

6. CONCLUSION

As distinguished through the writing audit, we reached a determination that main a minimal achievement is accomplished in the making of prescient Model for asd patients. We chiefly focused on early times of kid thus, that will be not difficult to make them fix. We researched the guardians By posing a few inquiries, in view of the guardians answer we have made a characterization to anticipate whether the kid have chemical imbalance range

Jumble or not. Rather than utilizing meds kid should be relieved by customary guiding or by regular home cures. The impacts of ASD Are frequently shocking; hence families and schools need to adjust to give the best to individuals with ASD to achieve their true capacity. In

genuine world Model this can be carried out in numerous halfway houses having the small kids. Whether there are any progressions in the development of a youngster or then again, the way of behaving of the youngster is different when contrasted with different kids then our methodology is exceptionally helpful. The methodology we utilized in us

Try is more viable to arrange various traits. Our outcome will show the better exhibition contrasting with other existing Approach of screening mental imbalance. In future work, more elements will be explored and elective ai calculations will be Assessed for expectation

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Modified Densenet for Face based Autism classification

Vijayalaxmi Angadi and Dr Amuthabala

School of CSE, REVA University, Bangalore, India
a.vijayalaxmi@gmail.com, amuthabala@gmail.com

Abstract.

Computer aided diagnosis has become important in medical applications to aid the medical practitioner in making accurate decisions. Autism disorder classification from face image is one such application. Many machine learning algorithms have been proposed to classify Autism disorder with various levels of accuracy. In this work, a modified dense net neural network model is proposed to classify face image images to two classes of Autism disorder or no disorder. The original dense net model is extended with some connectivity changes to improve the accuracy of the model in this work. The modified dense net model is able to learn intricate features from the face image and able to classify it with higher accuracy compared to other deep learning models.

Keywords. Autism, Densenet, Face Image, Computer Aided Diagnosis

1. INTRODUCTION

Autism is a hereditary neurological disorder with complicated causes and courses. Person with Autism disorder has impaired social interaction and interpersonal communication. Individuals with Autism disorder have reduced ability in recognition of emotions. They have reduced attention to faces and diminished eye contact. As Face is an indicator of interpersonal interaction and communication, using Facial features to detect Autism disorder has gained importance. This work explores the use of computer aided diagnosis to detect autism from face images. Computer aided diagnosis (CAD) is a process to augment medical professional or in some case replace them in clinical diagnosis. They use various machine learning and image processing algorithms to diagnosis diseases. Typical CAD has stages as shown in Figure 1.

Acquisition is the first step and it is all about acquiring the image from sources using devices like camera, scanners, sensors etc. The devices provide raw data which must be processed using techniques like sampling and quantization to convert to a digital form for storage. The image acquired from previous step must be pre-processed and made suitable for further processing. The performance of further steps is dependent on the efficiency of image pre-processing. The type of pre-processing to be applied depends on the application requirements. Also depending on image is color or gray scale, the type of pre-processing to be applied to the image also varies. After pre-processing, the next stage is segmentation. . In this stage, homogenous parts in the

image are identified and segregated. This segregation is done to identify similar areas of an image. Segmentation also segregates region of interest in the image. Segmentation is a important operation in various applications like computer vision, disease diagnosis etc. The segmented image is then represented in suitable form for further processing. Features like texture, intensity etc are extracted from the segmented objects. Machine learning based classifiers are then trained with the features to recognize the disease.

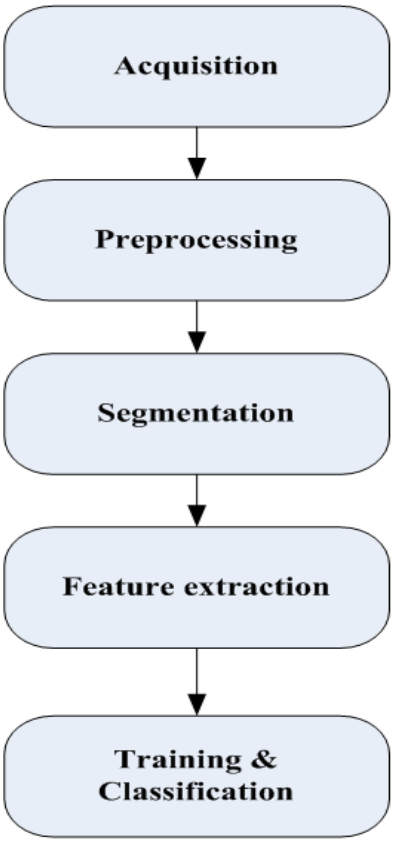

Fig. 1. Stages in Computer aided diagnosis

Machine learning is a algorithmic procedure which learns the patterns to recognize the classes in training stage and uses these patterns to classify any new cases. Deep learning is the last tend in machine learning where the features can be learnt automatically by the convolutional layers without manual description of features. By this way, deep learning models are able to learn intricate features from the images.

In this work, a deep learning model called dense net is adapted to classify the Autism disorder from face image. The original Densenet has more connections. The connections can lead to over learning and affect the accuracy. This work proposes connection optimizations in original Densenet for improved accuracy and reduction in classification time compared to original Densenet. The contributions of this work are as follows

(i)A improved Densenet model for Autism disorder classification solving the problem of over learning in Densenet model

(ii)Demonstration of higher performance in proposed improved Densenet compared to state of art existing works.

2. RELATED WORK

Kumar et al [1] proposed a hybrid deep learning model for predicting children behavior based on emotions. Deep learning features extracted are classified using naïve Bayes and decision tree. The result is then fused to detect emotions. Sadiq et al [2] detected Autism using linguistic patterns uttered by people. The linguistic utterances of both disorder and normal patients are collected. MFCC features are extracted from the dataset and classified using LSTM deep learning model to Autism or normal condition. Maenner et al [3] extracted vocal features during word and phase utterances from children and classified it using Random forest classifier to recognize Autism. However false positives is higher in this approach. Liu et al [4] analyze the eye movement using machine learning to classify the children with/without Autism. Since the analysis is conducted in controlled environment with limited challenges, the method has higher false positives. Omar et al [5] proposed a Autism prediction model for any age by combining Random Forest CART and Random Forest ID3. The method was tested on AQ-10 dataset. Bi et al [6] extracted features from functional MRI and trained a multi class SVM to classify non AUTISM and various AUTISM types. The method can also classifies the abnormal brain regions. But data acquisition procedure is complex in this work. Jamal et al [7] proposed a machine learning based classification to recognize Autism from EEG samples. Phase synchronized patterns are extracted from EEG samples for three cases of fearful, happy and neutral for both autism and normal cases. The difference between minimal and maximal occurring synchrostates is used as brain connectivity features and SVM classified is trained with these features to classify Autism. The method works only for EEG collected in a controlled environment. Kong et al [8] extracted brain connectivity features from the T1-weighted MRI images and used deep neural network (DNN) classifier to recognize Autism. Though this method was able to detect Autism with accuracy of 90%, the data acquisition must be done in a controlled environment. Caratte et al [9] made a visual representation of eye tracking patterns and used it for Autism detection. PCA features were extracted from visual eye tracking images and features were classified using SVM classifier. Wu et al [10] detected Autism from videos of directed gaze towards face or object of interest. Authors proposed two models: image based model and facial behavior features based model. Authors also proposed a feature selection process to identify the most significant statistical behavioral features to avoid class imbalance problem. Though the method achieved 80% accuracy, it could not select the most suitable frames for Autism detection. Akter et al [11] experimented with different machine learning classifiers like Decision tree, Regression classifiers, Neural network, SVM, KNN and Xgboost. Datasets from Kaggle were used for experimentation. The study found that Logistic regression has higher accuracy compared to other classifier. Fawaz et al [12] experimented with various deep learning model for Autism detection from face images. Face images collected from Kaggle were classified using CNN, VGG16 and Xception. The method was able to achieve an accuracy of 91%. Yoleu et al [13] proposed a deep learning approach to recognize facial expressions. Facial

expression detection is an important component of detection of neurological disorders inclusing Autism. Towards it, authors extracted local part based features with holistic facial information for robust facial expression detection. Haque et al [14] addressed the problem of facial expression detection in any environment. Deep convolutional neural network model was used for Facial expression detection with preprocessing of images for four different lighting conditions. Rudovic et al [15] integrated cultural background in face based Autism detection approaches to increase the accuracy. Small amount of information about target children is fused through transfer learning to achieve higher accuracy of Autism detection.

Though Deep learning has been used extensively for Face based Autism detection, still there is a research gap in selection of a best model which can learn discriminative features for Autism detection. In this work an improved Densenet model is proposed to solve this problem.

3. METHODS

The stages of the proposed solution are given in Fig 2.

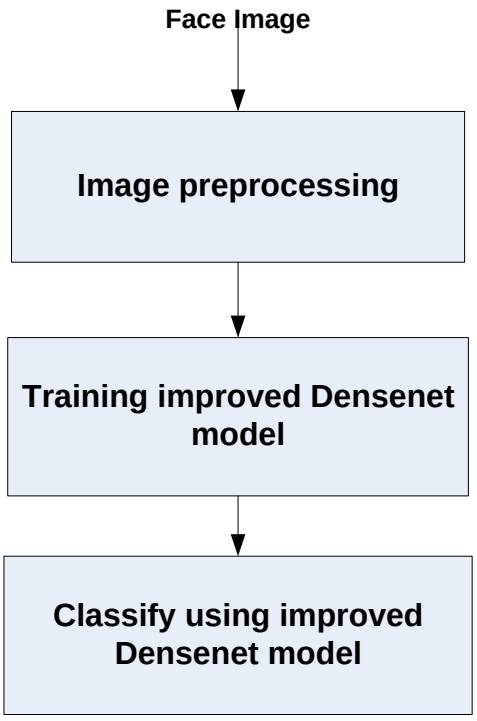

Fig 2. Stage of proposed solution

The Face images are first preprocessed during both training and classification before passing to Improved Densenet model.

Image is preprocessed by doing normalization, binarization, morphological operation and orientation. Normalization is a process that changes the range of pixel intensity values. The

purpose of normalization is to bring image to range suitable for processing. Linear normalization is the process that changes the range of pixel values linearly, that is the input image is scaled linearly to scale required in the output image. In binarization process, the normalized image is converted to binary using OSTU thresholding. After binarization, morphological processing is applied on the image in terms of opening and closing operations. Opening is an image morphological operation that darkens small objects and entirely removes single-pixel objects like noise spikes and small spurs. The opening operation is erosion followed by dilation. Closing is an image morphological operation that completely removes noise involved within the object, and reduces the noise within the background. After morphological operation, the image is brought into standard orientation using random transform. After orientation, the image is resized to size of 224×224.

The preprocessed face images are taken to next stage of training the improved Densenet model.

Densenet is a recent deep learning model proposed for computer vision and object recognition applications. Similar to Resent, Densenet model is designed to solve the vanishing gradient problem. In addition, the convolution features of each layer are passed to subsequent layers as input in Densenet. Due to this, more intricate features can be learnt using the Densenet model.

The intricate features learnt are able to provide higher accuracy. The accuracy is generally lower in CNN with more layers due to vanishing gradient problem. In CNN with more layers, the features vanishes in the longer path travel and due to this, intricate features cannot be learnt.

A Densenet model has many dense blocks with varied number of filter. The dimensions are unique within the blocks. Between blocks, a transition layer is placed to do batch normalization. By this down sampling is done to match to dimensions of the subsequent layer. This work does changes in the Densenet model to improve the accuracy. The architecture of the improved Densenet model is given in Figure 2.

Fully connected layers are cut and replaced with fully convolutional layer. Also the pooling at layer 5 is removed to increase the stride by two times and compensates for edge localization. To attain hybrid features the convolutional layer is set to have a kernel of size 1×1 and channel depth 21. The resulting features from each convolution are accumulated with an additional layer. The feature map is up sampled at this additional layer with a convolutional layer of size 1×1. At up sampling layers, cross-entropy loss/sigmoid layer is attached.

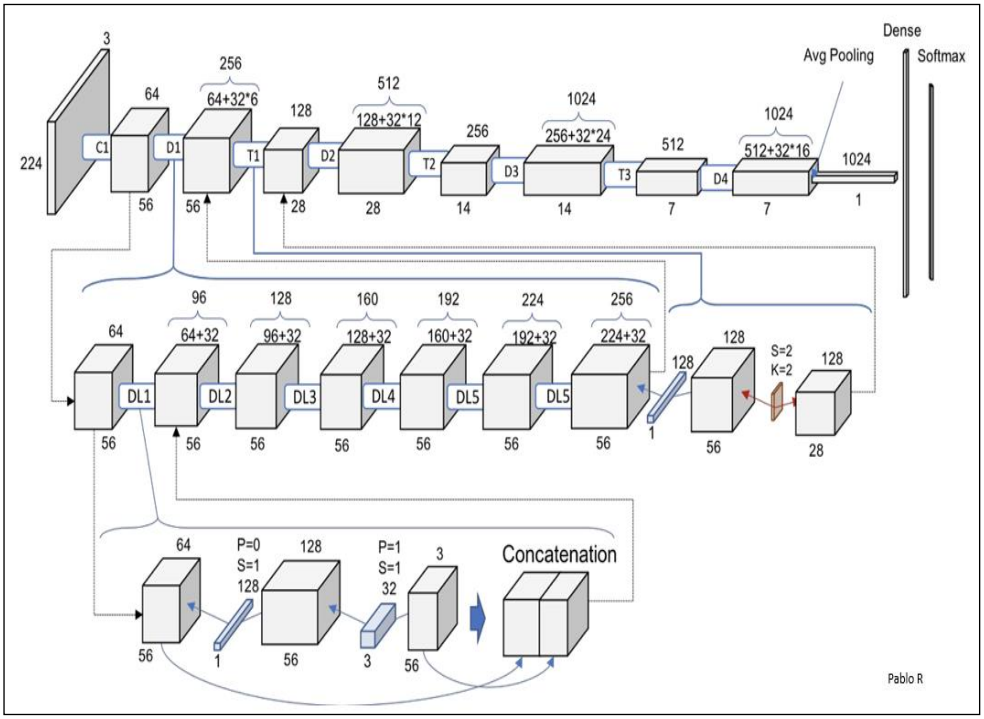

Fig. 3. Improved Denset model

A dataset of training images in two categories of Autism and normal is prepared. The dataset is split into training and test set in ratio of 80:20.. The training set images are used to train the improved Densenet model. The improved Densenet has following innovations.

(i).Fully connected layers are cut and replaced with fully convolutional layer. Also the pooling at layer 5 is removed to increase the stride by two times and compensates for edge localization

(ii) Updating the convolution operation with Local binary Pattern (LBP) feature based masking to improve the learning ability.

For a input gray scale image (q) of size 64×64 to the convolution operation, Local binary pattern (LBP) is computed. This LBP result and each of masks of default convolutions are joined with logical AND operation. Each of the 30 result after AND is then convolved with 7×7 kernel and summed up to get the output feature map. The output feature map with new convolution is given as

$$C(q)= \sum_{m=1}^{M} \sum_{n=1}^{N} [AND(LBP(q),mask(m)).K] (j) \quad (9)$$

Where M is the number of masks, N is the number of kernels and mask(m) is the binary mask of m^th pattern.

With this two innovations, the learning ability of the Densenet improves. It is able to identify more discriminative features and due to short circuiting, the classification time decreases.

After training, the test set images are passed to test the efficiency of the improved Densenet model.

4. RESULTS

The performance of proposed improved Densenet solution is tested using Autistic Children Facial image dataset collected from Kaggle[16]. The dataset has 1327 face images of Autistic children and 1327 face images of non Autistic children in the dataset. The dataset set is split to training and test set in ratio of 80:20.

The accuracy over various epochs in the proposed solution is given below

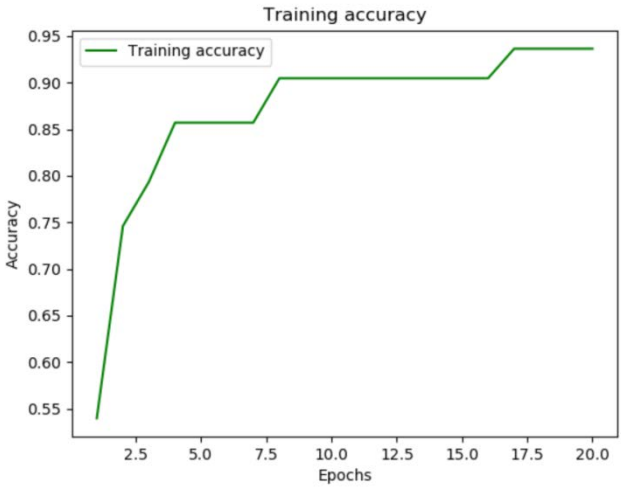

Fig. 4. Accuracy of proposed improved Densenet

The proposed solution was about to achieve about 93% accuracy at an epoch of 20 seconds. The training loss was measured for various epochs in proposed solution and the result is given below

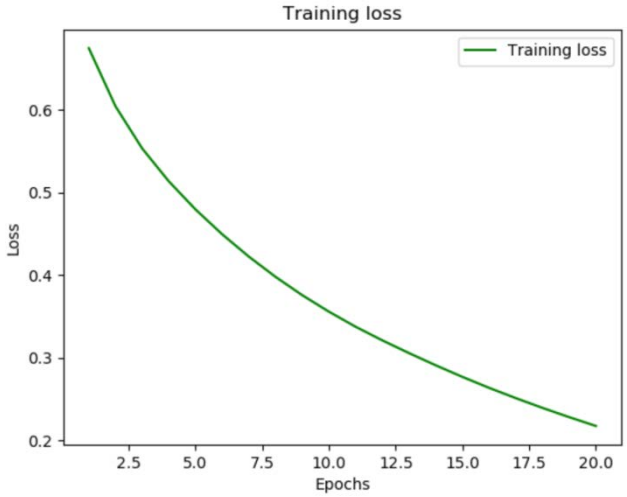

Fig. 5. Loss of proposed improved Densenet

The loss is minimal at 0.22 in epochs of 20. As the epoch increases, the loss decreases. It can be inferred that further increment in accuracy and reduction in loss can be achieved by increasing the training volume and increasing the epochs.

The performance of the proposed solution is compared against the deep learning model used in Fawaz et al : CNN, VGG16 and Xception

The comparison of accuracy and time for classification across recent works are given in Table I.

TABLE 1. COMPARISON OF PROPOSED SOLUTION

Model	**Accuracy**	**Time (seconds)**
CNN	0.85	0.21
VGG16	0.87	0.23
Xception	0.89	0.37
Proposed Densenet	0.93	0.34

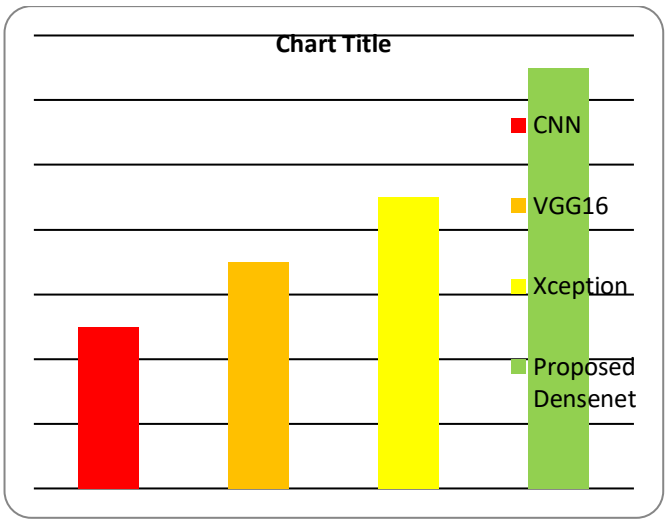

Fig. 6. Compariosn of accuracy

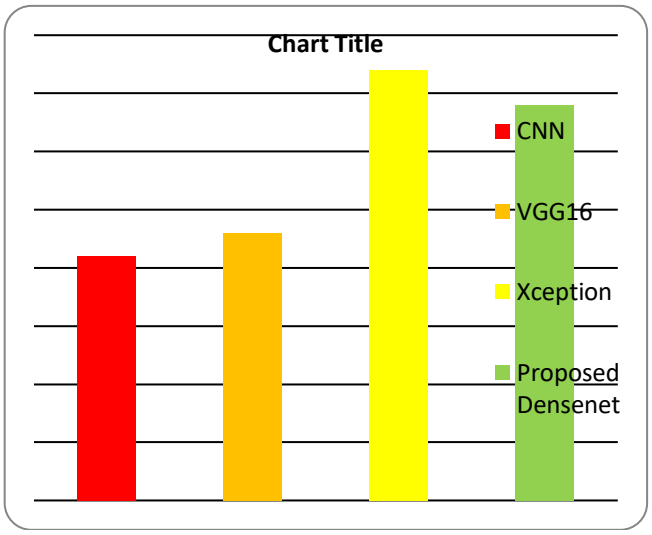

Fig. 7. Compariosn of classificaiton time

The proposed solution achieved an 8% higher accuracy compared to CNN, 6% higher compared to VGG16 and 4% higher compared to Xception. The accuracy has improved in the proposed solution due to two factors: better quality image due to preprocessing and more discriminative feature learning ability of improved Dense net. While other models like CNN, VGG16 and Xception are deep learning, the image was not enhanced before passing to deep learning stage and this affected the segmentation process.

The higher accuracy is achieved in proposed solution at cost of small increment in the time for classification compared to other models. As the number of interconnections is higher in the Densenet model compared to other deep learning models used in existing works like CNN, VGG16 and Xception, it has higher time compared to them, but due to optimization introduced, the proposed improved Densenet has lower time compared to original Densenet.

The comparison of performance of proposed solution with default Densenet (without any modification is compared) to gain insights into the effectiveness of proposed modifications and the result is given in Table 2

TABLE 2. COMPARISON WITH DENSENET

Model	**Accuracy**	**Time (seconds)**
Default Densenet	0.84	0.42
Proposed Densenet	0.93	0.34

The proposed improved Densenet is able to increase the accuracy by 9% and reduced execution time by 19% compared to default Densenet. This reduction is execution time is due to short circuiting certain interconnections to prevent from over fitting. Prevention of over fitting increased the accuracy by 9%.

The performance of the proposed Densenet model is tested with and without image preprocessing and the result is given below.

TABLE 3. IMAGE PREPROCESSING GAIN

Model	**Accuracy**	**Time (seconds)**
Without Image processing	0.88	0.39
With Image preprocessing	0.93	0.34

The proposed improved Densenet is able to achieve 5% more accuracy due to image preprocessing. The image preprocessing, is able to able to improve the contrast and localize the tumor patterns more effectively and this has increased the accuracy. The preprocessing operation has taken 12% higher computation time but considering the time is only 0.5 seconds and the accuracy gain of 5% this delay is tolerable.

5. CONCLUSION AND FUTURE WORK

An improved Densenet model is proposed to recognize Autism in this work. The proposed changes in Densenet model has helped to achieve a accuracy of 93% , which is 4% higher compared to existing deep learning models. Also the proposed changes have reduced the classification time by 0.03 seconds. Testing the effectiveness of proposed solution against larger dataset and extending the model for different age groups and culture is in scope of future work

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An Innovative Approach to Control and MonitorI.V(Intravenous)Fluids

Suhasini S Hosamani
M.Tech in Computer Science
& Engineering
REVA University, Bangalore
Suhasinis48@gmail.com

Dr. N P Nethravathi
School of Computer Science
& Engineering
REVA University, Bangalore
nethravathi.np@reva.edu.in

Abstract—***Traditionally, doctors and nurses estimate the time, which takes for an IV bottle to empty based on their expertise, making I.V (Intravenous) therapy prone to misstep. The presentanalysis suggests acyber spaceenabled I.V drip chamber monitoring platform. The technology permits medico and healthcareassistance to remotely auditordrip criterion,interim focusing on economical and great responsibility. In this work, a capacitive sensor is acclimated to determine the flow of liquefied in the bottle and the servo motor to give live update and management of the fluid flow through the device. Moreover, the projected system can have the scope of a programmer employing an input device and wi-fi permitting the para medical staff to provide new commands. Ultimately it facilitates the work of doctors, nurses, and alternative associated personnel or any para medical staff. The purpose of this work is to design an I.V (Intravenous) with the ability to immediately stop the flow of an I.V (Intravenous) and send a notification to the nurses and physicians, reducing the labor of nurses and doctors which also helps to prevent I.V related fatalities.***

Keywords—:*I.V (Intravenous) therapy, I.V bottle, Capacitive sensor, Para medical staff.*

I. INTRODUCTION

I.V Drip Set is used to deliver nutrients and hydration directly into the bloodstream for immediate absorption and use by the body. Intravenous Therapy is the quickest way to get nutrients into the body because it bypasses the digestive system and goes straight to the organs, resulting in absorption rates of 90 to100 percent. Administering I.V lines is a regular action for any health care assistant in almost every hospital (Nurse). The necessity for fluid and electrolyte assessment and management is the most basic requirement. In the hospital, the I.V-line monitoring is done entirely by nursing assistants. The I.V bottle level is monitored by the health care assistant. Unfortunately, the observer may forget to change the bottle at the appropriate time due to their busy schedule. Simple IV bottles with no further indication are used in the hospital. Any form of failure can cause different medical problems such as blood backflow in I.V setup. In certain situations, if the bottle gets empty and has not been checked for a certain duration, the air bubble may also be placed in the IV tube, which can be fatally monitored and thus vital. To prevent this, the current technique will facilitate the work of doctors, nurses, and alternative associated personnel or any para medical staff. The purpose of this work is to design an I.V with the ability to immediately stop the flow of an I.V and send a notification to the nurses and physicians, reducing the labour of nurses and doctors which also helps to prevent I.V-related fatalities.

Main scope of work is to design an IV Stand which informs the health care assistant. Keep an eye on the IV line to signal the assistant that he has to come in right away.

Fig1: Blood back flow

Fig2: Air bubble

II. RELATED WORK

A light sensor-based device is proposed by Raghavendra B etal., In [2016]. Reduction in complications associated with IV drip system was achieved with such a device, particularly in resource limited settings. Reliant on the shape of container was problematic to replicate drip rate outcomes.

In [2017] Ramisha Rani K etal., proposed" Smart Drip Infusion Monitoring System for Instant Alert". They developed an effective system capable of monitoring the point of the IV drip administered to the patients in the clinic and evidence for the same. This recorded info can be analysed in the medico station remotely for later reference. The recorded reports can be presented adequately with accurate info in a graphical way. Consumption of energy was more due to graphical representation, was expensive, not all hospitals could afford.

Keerthana K etal., "A Survey of Systems used in the Monitoring and Control of Intravenous Infusion". They developed a system to classify the process of intravenous infusion regulation and monitoring with the help of infrared detection sensor. They aim at regulating the rate of infusion and sending an alert in case of events like drastic change in flow rate nil flow or blockage of the tube. Display consumes high power (due to IR sensor were attached to the drip chamber).

In [2019] Sincy Joseph etal., proposed "Intravenous Drip Monitoring System for Smart Hospital Using IoT".They implemented an I.V drip surveillance entity to diminish the work of medical management. The main features of this system are installation of hardware as well as software sensors, fletching and storing details in an electronic information service. Rectification of gathered details to imbrute the drip reviewentity was tedious.

In [2020] Mahak Goyal etal., "I.V (Intravenous)tube flow control device with IOT" They used Capacitive sensor to function whether there is solutionuseablein the packet or not, in case that detected air in the ampul, later the testimonyisdirected to NodeMCU. Theindication of this task is to flourish an IV with potentiality so the discharge of an IV can spontaneouslyblock and analert will be emitted to

paramedical workers which also help to reduce the casualties related to IV. No proper alarms were generated due to network connectivity.

In [2020] Sanjay S etal., "Iot Based Saline Infusion Monitoring and Control System." They proposed a framework for IoT Based Saline Infusion Monitoring and Control System that makes use of Arduino and Node mcu. The theory is used to informant the saline elevation, such that, it automatically stops the saline flow to the patient when the saline level reaches 20% of its total volume. Was working only for saline solutions but not for other solutions.

In [2021] M. Safitrietal., "Short Text Message Based Infusion Fluid Level Monitoring System" The entity was depiction to control the fluid infusion points by absorbing a short text message system. Which will provide disclosure when the infusion point is at 50 ml, 20 ml, and 0 via SMS by using SIM Modem 900. Infra-red sensors and photodiodes are worn to encounter intravenous droplets of fluid, which calculates fluids' volume. Based on the analysis, infusion solution flow monitoring systems had the rate of program failure when detecting aqueousimpart was just 1,21%.

In [2021] P. Sardana etal., "Design, fabrication, and testing of an internet connected intravenous drip monitoring device" The present study proposes aweb connected exanimating for IV drip chambers. It has two majorparts, specifically chamber part and pole part for level disclosure. The organized info was solidly and assuredly accrued to virtual service adopting HTTP API calls (Hyper Text Transfer Protocol). This input was mended and envisioned for ease of legibility for healthcare takers. There was a lag while transferring the message to concern paramedical staff due to traffic issue or noise distortion.

III. CLINICAL SURVEY OBSERVATION

Clinical studies were carried out through visits to a variety of healthcare centres and a detailed survey through a systematically designed questionnaire for the healthcare providers. Based on the data collected through the survey, the following observations were made. • A positive response was received when asked if the stopping of drip as soon as the drip bottle gets empty as necessary. • Paramedical staff members agreed that the occurrence of blood backflow is very often when the drip bottle empties and the flow is not stopped. • Doctors and nurses agreed to the fact that a simple device that can monitor and control IV drip administration would make their jobs easier.

IV. PROBLEM STATEMENT

The fundamental issue with IVs is that a nurse would be Refilling or modifying the IV. Generally, this operation is extremely exhausting and time-consuming and requires the full participation of nurses during the day of the hospice where there are just one or two nurses for every ten to fifteen patients. Even if we are using a heavy

machinery-built IV indicator, this is very expensive for starters and does not fix the problem of notifying the patient that he/she needs to change the IV on time.

V. OBJECTIVE

IOT-based automatedmodifying and determining the tool is designed where sensor's utilized. When the Fluid level is empty, it will alert the observer by sending a notification to mobile.

The work will be focused on achieving these objectives:

1. To develop a case to indicate the liquid surface level of IV fluid and alert the heath care assistant for timely intervention.
2. To send the alert message when the fluid rate is FULL, HALF, EMPTY, as the device count the flow of the solution and monitor infusion flow rate.
3. To design the device, compact with the existing IV stand by using IFTTT application, as the monitoring can be done by the medical staff staying away from the patient site where Wi-fi is enabled, as an application-based alert intimation for the health care assistant.
4. To add keypad buttons and Help button for manually controlling and monitoring infusion rate flow by any para medical staff.

VI. SYSTEM ARCHITECTURE

Major things in the proposed system are Esp32- Microcontroller, 2 conductive electrode strips. We have Esp-32 Microcontroller, which has been used and it is programmed according to the requirement and is used to assign the notification on streamed and Blynk application is used to post alertsallied to IV to medical causalities.

• The Capacitive sensor has been connected to the I.V packet which conveys the packet is empty or not. As the fluid gets vacant, the parallel plate sensor is linkedto Esp-32 microcontroller that regulates the position of saline liquid.

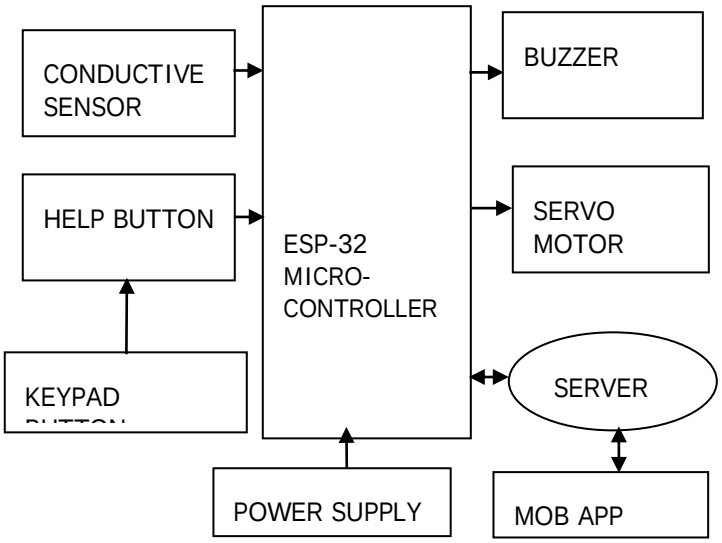
• As the discharge has been blocked the stature of position of the fluid will be sent to a blynkserver. Esp-32 microcontroller has Wi-Fi competence that willcirculate this notification on the internet.

• For control the infusion flow wirelessly we can do it by using servo motor with the help of IFTTT application, which helps in recognizing the voice and perform actions for controlling and monitoring the flow of I.V solution.

• To control the infusion rate flow manually we are making use of key buttons, which help to control the I.V solution in the bottle.

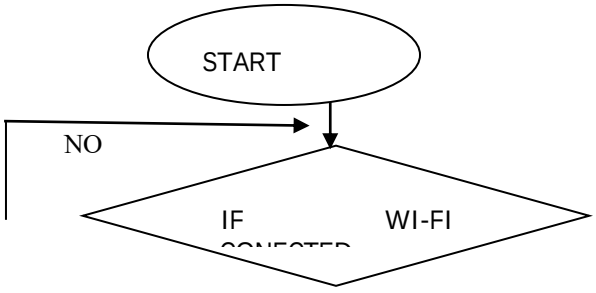
• In the case of any emergency, patient concern person can use help button, which helps doctor or para medical staff to intimate the issue and rectify it with help of buzzer and help notification.

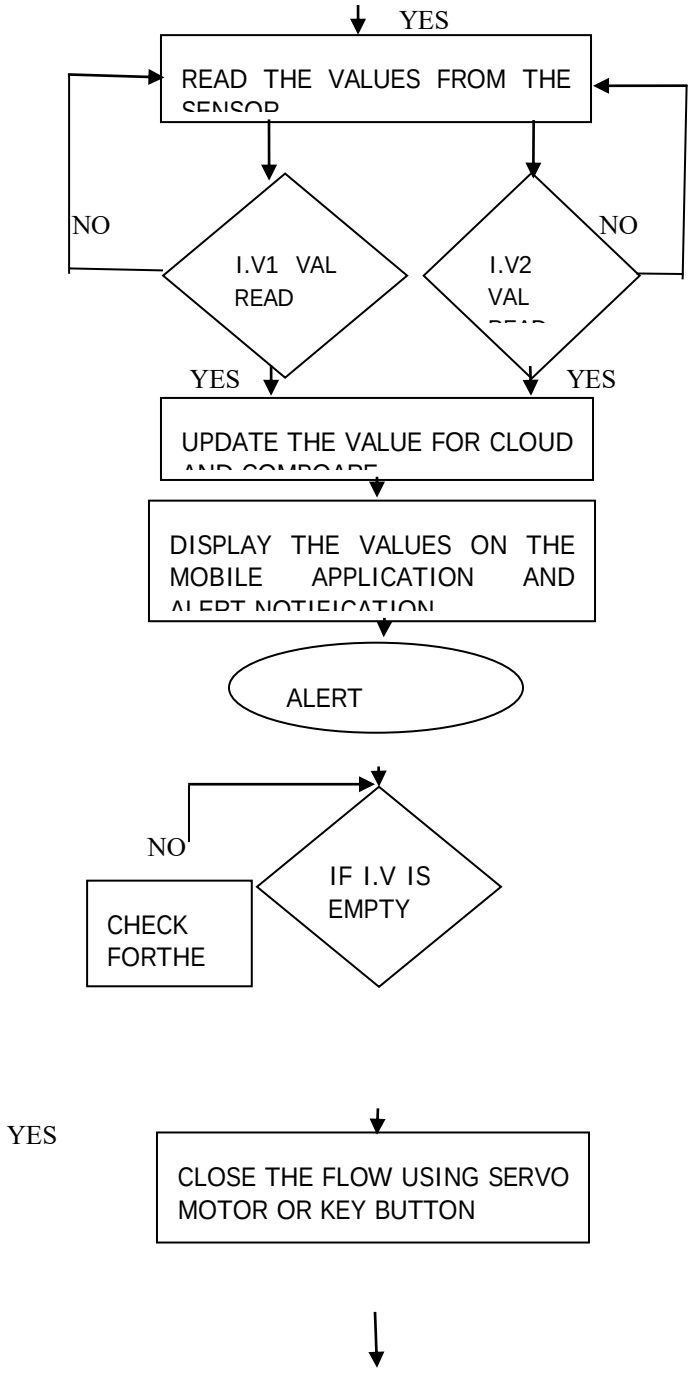
• Blynk application can be acquired by respected paramedical workers which will be a vast avail to medical healthcare takers as they have the expertise of the I.V saline solution level.

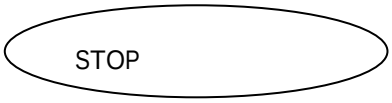


VII. PROPOSED SYSTEM

In this work a regulating and monitoring device that might be retrofitted to an existing I.V. infusion system. I.V. (Intravenous) therapy is prone to human error since doctors and nurses estimate the countdown whichcaptures for an I.V packet to vacant depending on their expertise. A capacitive sensor is enforced in this work to determine flow of a fluid in a bottle, and a servo motor is used to provide real-time updates and management of the fluid flow through the device. Finally, it aids the work of doctors, nurses, and other ancillary professionals, as well as any paramedical personnel. The goal of this project is to create an intravenous (I.V) with the ability to promptly stop the flow of an I.V and send a notification to nurses and doctors, decreasing nurse and doctor workload while also lowering IV-related mortality.




YES
READ THE VALUES FROM THE SENSOR
NO
I.V1 VAL READ
I.V2 VAL
NO
YES
YES
UPDATE THE VALUE FOR CLOUD
DISPLAY THE VALUES ON THE MOBILE APPLICATION AND
ALERT
NO
IF I.V IS EMPTY
CHECK FORTHE
YES
CLOSE THE FLOW USING SERVO MOTOR OR KEY BUTTON



VIII. SYSTEM REQUIREMENT

- Software requirement
  - Arduino ide
  - Blynk
  - Ifttt

- Hardware requirement
  - ESP32
  - Conductive sensor
  - Servo motor
  - Buttons
  - Jumper's
  - Bread board
  - Power supply

IX. METHODOLOGY

- Major things in the project are Esp32- Microcontroller, 2 conductive electrode strip, servo motor.we have Esp-32 Microcontroller, which has been used and it is programmed according to the requirement.
- To carry out this demonstration, we willinitiate this apparatus as follows: First and foremost -, our driver circuit with conductive electrode strip, isprimarily acts as a parallel plate capacitor which changes its output voltage with the change of its dielectric medium in between its plates, which senses the amount of saline solution in the I.V packet.
- The corelate plate has been associated on the I.V packetwhich tell us if the solution is empty or not. As it gets vacant,the capacitive parallel levelsensor is linked to the Esp-32 microcontroller which controls the position of liquid. Once the liquid flow has been stopped, the condition of the saline fluid will be emitted to a server. Esp-32 microcontroller has WI-FI potential used to circulate this notification on stream.
- Blynk application can be penetrated by esteemed medical staffs which tends to be great help to nurses as they have the understanding of the saline level.
- As the fluid level decreases nurse will get an intimation i.e., notification indicating as empty.
- To control the infusion flow they will be having two options: Firstly, voice command can be given from elsewhere using IFTTT by following commands,

- TURN OFF - Where turn off condition is used for turning off the infusion flow.
- TURN MIDDLE - Where turn middle condition is used for turning middle the infusion flow.
- TURN FULL - Where turn middle condition is used for turning fully with respect to infusion flow.
- By using above conditions over a voice, we will be able to control the infusion flow. To function above conditions wirelessly, I have used new technology for voice over controlling the functions i.e., IFTTT (if then than that). where the voice is controlled by google assistant and based on voice command the servo motor functions whenever any paramedical staff is away from the patient site.
- We are using Servo motor, has integrated gears and a shaft that can be specifically composed. It let on the shaft to be positioned at discreate angles, by taking these angles we have 3 conditions:
- Full – is used for raising the infusion flow when angle is at 180 degrees.
- Half – is used for quite slowing down infusion flow when angle is at 90 degrees.
- Close – completely closing the infusion flow when angle is at 0 degree.
- The above conditions work wirelessly by using IFTTT and based on voice command, the servo motor allows the rotation of the shaft. Which further helps in monitoring the infusion flow when nurse or any paramedical is away from the patient site.
- By this work, will be an enhancement in the extant I.V infusion packet as this will have network connectivity and control aspects.
- This way the whole mechanism will be embraced for the apt functioning of the I.V system.

X. RESULT

- Result 1: when fluid is full inbottle

If sm1val is 0 and sm2val is 0 then it will detect the water or any saline solution in the packet and willresult it too full.

When it is full then led 1 gets on. So, in this device, I have given led1 as green colour whichindicates that the solution inthe packetisfull.

In bylnk application, on V7 led, itwillbe writingdown theI.V. stateasFULL, based on the quantity of the solution.

- Result 2: when fluid is half in bottle

If sm1val is 1 and sm2val is 0 then it will detect the water or any saline solution in the packet andwill result it to half.

When it is half then led 2 gets on. So,in this device, I have given led2 as yellow colourwhich indicates that the solution in the packet is half.

In bylnk application, on V7, it will be writing down the I.V. state asHALF, based on the quantity of the solution.

- Result 3: When fluid is empty in bottle

If sm1val is 1 and sm2val is 1 then it will detect the water or any saline solution in the packet and willresultittoempty.Whenitisemptythenled3getson.So, in this device, Ihavegivenled3asredcolourwhich indicates that the solution in the packet is empty.

In bylnk application, on V7, it will be writing down the I.V.stateas EMPTY, basedon the quantity of the solution.

Since the I.V state is empty. It will be sending the

notification to any para medical staff, until they

removeor update the injectedI.V.

- IFTTT command creation

The below details, indicates the creation of 3 commands in IFTTT application using google assistant and webhooks.

TURN FULL – if we say TURN FULL over a voice then it gives a web request for turning the infusion flow in full state.

TURN MIDDLE – if we say TURN MIDDLE over a voice then it gives a web request for turning the infusion flow in middle state.

TURN OFF – if we say TURN OFF over a voice then it gives a web request for turning the infusion flow in off state.

- Result 4: IFTTT turn off command

Below description says how do we create a simple phrase for voice command for TURN OFF and how does it function back to the voice over command from the website using authentication token and with the servo motor angle at 0 degree.

when the voice command TURN OFF is given to google assistant, the flow of the infusion rate will be in normal flow. The servo motor will be at 0 degree which indicates the nob is in off state.

- Result 5: IFTTT turn middle command

This result express how do we create a simple phrase for voice command for TURN MIDDLE and how does it function back to the voice over command from

the website using authentication token and with the servo motor angle at 90 degrees.

when the voice command TURN MIDDLE is given to google assistant, the flow of the infusion rate will be slightly higher than the normal flow. The servo motor will be at 90 degrees which indicates the nob is in middle state.

- Result 6: IFTTT turn full command

This result defines, how do we create a simple phrase for voice command for TURN FULL and how does it function back to the voice over command from the website using authentication token and with the servo motor angle at 180 degrees.

when the voice command TURN FULL is given to google assistant, the flow of the infusion rate will be fully higher than the normal flow. The servo motor will be at 180 degrees which indicates the nob is in full state.

- Result 7: Manually controlling the flow of I.V solution using key buttons

There are 3 buttons which helps in controlling the flow of I.V,

1. 1st button: by pressing this button it helps in increasing the infusion flow rate of I.V solution.
2. 2nd button: by pressing this button we can moderately control the infusion flow rate of I.V.
3. 3rd button: by pressing this button we can stop the infusion flow of I.V solution.

- Result 8: Help button

Help button is used in case of any emergency. The patient can press this button, once they press the help button- buzzer gets on if any paramedical staff is near then they can come and rectify the issue.Apart from this, will be initiating help notification on Blynk application which will be further intimated by any paramedical staff.

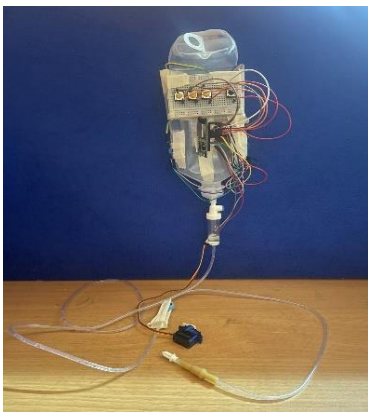


Fig 3: Model Setup

The above Figure is the representation of the complete model Setup with ESP32, Servo Motor, Conductive Sensor, and Help Button.

XI. CONCULSION

In our proposed system, we will be designing and implementing an automatic intravenousfluid control device. Thisdevicewilladvancethepatientcareandmakeittrouble-free. Our proposed system will be a perfect helping hand in case of controlling intravenous fluid for theclinical aspects as it has ability to immediately stop the flow of an I.V (Intravenous) and send anotificationtothenursesandphysicians,reducingthelabourofnursesanddoctorswhich alsohelps to preventIV-related fatalities.

XII. FUTURE SCOPE

- We need to design and manufacture the dedicated flow control knob for the infusion of I.V.
- We can further add patient monitoring system to the same which monitors the parameters such as heartbeat, SPO2 value, Temperature etc.
- we can develop our customized Android Application for the same.

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Voice Assistant Using Face Authentication

Vishnusai Bhonsle
Computer Science And Engineering (student)
REVA University
Banglore,INDIA
vishnusai.bhonsle@gmail.com

Deeksha Chilukuri
Computer Science And Engineering (student)
REVA University
Banglore,INDIA
chilukuri.deeksha@gmail.com

Bhoomika.N
Computer Science And Engineering (student)
REVA University
Banglore,INDIA
bhoomikanag@gmail.com

Chirag Girish Purohit
Computer Science And Engineering (student)
REVA University
Banglore,INDIA
2000chiragpurohit@gmail.com

sailaja Thota
Computer Science And Engineering(Assistant Professor)
REVA University
Banglore,INDIA
sailaja.thota@reva.edu.in

***Abstract*—Voice assist is becoming increasingly popular. The most popular voice assistants are Google Assistant, Amazon's Alexa, Apple's Siri, and Microsoft's Cortana. Voice virtual assistants were becoming increasingly popular, particularly among younger people. According to the report, these voice assistants have a history of giving unwanted access to the device and inflicting damage to the owners as a result, software security is crucial. We developed facial and voice recognition technologies to handle security problems and unauthorized access, and they are useful in identifying unwanted trespassers and suspects.**

Keywords-Voice Assistant, Face Authentication, CNN, NLP,SVM, Anti-face spoofing.

I. INTRODUCTION

Voice assistant technology, which was once thought to be science fiction, is now a reality. From an academic perspective, these voice assistants are also known as Intelligent Personal Assistants and Speech-based Natural User Interfaces (NUI).Using voice recognition, language processing algorithms, and voice synthesis, the voice assistant listens to specific voice commands and returns relevant information or performs specific functions as requested by the user. By listening for and filtering out specific keywords, background noise, voice assistants can revert back relevant information.

Artificial intelligence and voice recognition are the technologies behind the voice assistant, which measure accurately and efficiently to deliver the result that the user is looking for in response. Because of its flexibility and extensibility, there are several voice assistants that specialise in a specific feature set, while others prefer to be open-ended and assist with almost any situation at hand. Users may ask their assistant's questions, control home automation devices and media playback, and manage other basic chores like email, task reminders, and calendars via voice commands.

There are many voice assistants available in today's world, and due to their popularity, they have a large user base. However, there is no guarantee of security for the voice assistant application because voice can be tampered with and modified, resulting in unauthorised access. So, in order to protect our voice assistant application, we're putting a face recognition system in place.

II. LITERATURE SURVEY

The methods used in the development of a virtual assistant differ between the various products available on the market in reference[1]. One product may be better in terms of voice synthesis quality, while another may provide more accurate results. As voice assistants become more prevalent in our daily lives, we may find ourselves having to repeat ourselves from time to time in order for the VA to understand our commands.

Customers can take control of their voice interactions when they interact with a virtual assistant (VA) who combines functional intelligence, sincerity, and creativity. Voice assistants are becoming increasingly popular. However, as reference[2] shows, security issues in VA, such as unauthorised access, may be accepted at some times.

[3] Face recognition automatically detects the human face in live video images taken with a video camera. Face recognition is the best computer vision, but poor image capture can make it difficult to identify the image.

In reference [4] shows End-to-end learning for the task using a convolutional neural network is progress in this area (CNN). This work is primarily concerned with deep architectures for face recognition. Face recognition can analyse images and videos from a variety of sources. Concerns about data privacy with facial recognition make it vulnerable to hackers.

In reference [5] derives Despite decades of effort, human activity recognition remains an immature technology that has drawn a large number of people interested in computer vision. In this paper, a system framework for recognising multiple types of activities from videos using an SVM is presented. It is more efficient in high-dimensional spaces and makes good use of memory. It does not work well when target classes overlap, and it begins to lag.

A binary tree based SVM multi-class classifier. The framework is made up of three functionally linked modules: shows in reference [6], (a) detecting and locating people using a non-parameter background subtraction approach. (b) extracting various features. (c) identifying people's activities using an SVM multi-class classifier whose structure is determined by a clustering process.

This method is best suited for classes with distinct separation margins; it also works well when total dimensions exceed sample dimensions. If the number of features for each data point exceeds the number of training data samples, the SVM will underperform.

Natural Language Processing (NLP)is defined from reference [7]as the study of language issues in human-to-human and human-to-machine communication. We get an exact response in a matter of seconds because NLP is very time efficient. The NLP system is designed for a single, specific task.

In this case, [8] This technical briefing gives an overview of NLP tasks, available techniques, supporting tools, and NLP technologies. The amount of relevant information provided by the NLP system increases the accuracy of the answer. NLP is unable to adapt to new domains due to its limited functions.

Virtual assistance in the market is lacking with the privacy issues and following command to execute process where the command will perform without any authorization of user.

III. METHODOLOGY

In this paper, we propose a light-weight voice Assistant that uses face authentication to process requests and responds to the user with a synthesised voice and the required action. the voice assistant in our paper was implemented with an adaptive search engine where users can search things not only on the internet but also on a specific platform. we built voice assistance such that to support multiple platform devices like house automation tools, tv, computers, etc. the assistance is equipped with smart face authentication which help's the software to support security aspects. the command checker of our software will verify the input into authenticated or unauthenticated. If the user command is not authenticated, respond with a synthesised voice and the required action. However, if the user command is authenticated, the user must provide face authentication in order to complete the required action. Figure 1 depicts the high-level architecture of voice assistance.

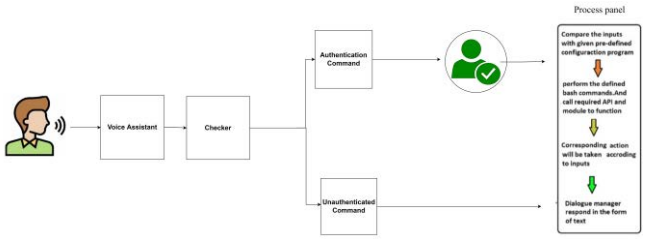

Fig 1: Architecture of voice assistant using face authentication

The architecture is divided into two-parts

1) voice assistant: Voice assistants can return relevant information after listening for specific keywords and filtering out background noise.

The architecture was divided into three parts:

speech Recognition: The voice assistant should be able to understand and respond to the vocal request. There are numerous speech-to-text converter APIs on the market. we used to google API to convert speech to text. the text will be processed to the command checker module.

command checker module: The command checker module will check the processed text received from the speech recognition module and verify the command is authorized or unauthorized and execute to process panel with or without authentication depending on the command panel process:

The process panel will maintain a knowledge base of prepared commands that are linked to the relevant APIs for the required activity

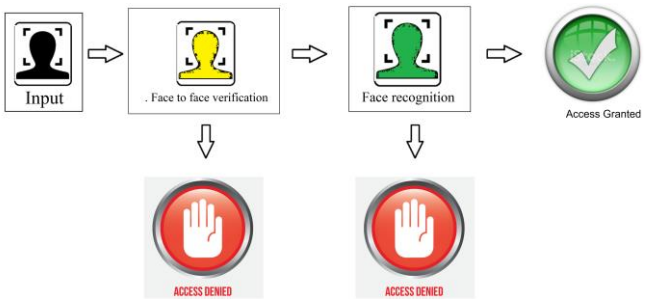

Fig 2: Functional Architecture of Face authentication

2) Face authentication: The face authentication system automatically identifies faces in images and videos from a live stream. It is divided into two modes:

1. Face to face verification (or authentication)

2. Face recognition (or recognition)

Face Verification: the module was designed to counter the face spoofing attacks using dual-stream convolutional neural networks. this module will be able to determine the input face received from Livestream is real or fake.

Face identification: the module is used to compare the face received from the face verification module with the stored in our database and if it matches more than 80% it will allow user to get access

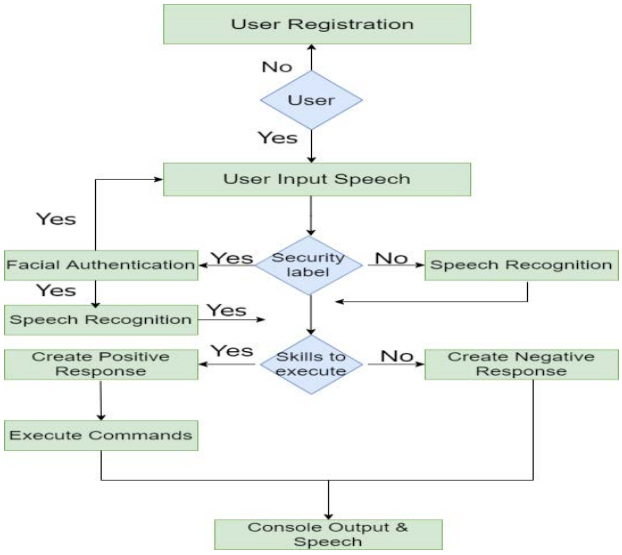

Fig 3: Functional Architecture of voice assistant using face authentication

IV. IMPLEMENTATION

Face Authentication Implementation

In our system, we designed the authentication process such that whenever the user gives the input to the system it will check with the face verification process, and then if the process is verified then it will be checked with the face identification module for 15 times and then it will be looped with face verification for 5 times shown in the Fig 2. the above-stated process will help the software to prevent unauthorized access and to improvise the accurate verification process in the system.

Architecture implementation

In the implementation of our software, we designed the system such that the user needs to register his/her face id with the username shown in Fig 3. After registration, the system will save the face IDs and usernames in the database. the authorized user can be able to access all the features of the system with full potential.

V. RESULTS

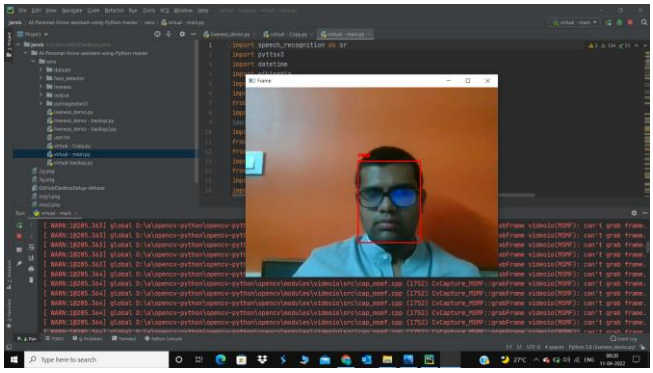

Fig 4: Result image.

we showed that when the user gave authorized command the software was able to authorize the user by undertaking the process of face verification

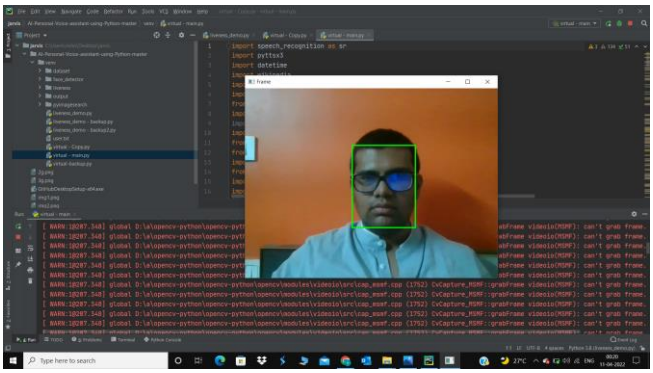

Fig 5: Result image.

we showed that when the software was successfully able to complete the process of face verification it will undergo the process of face recognition.

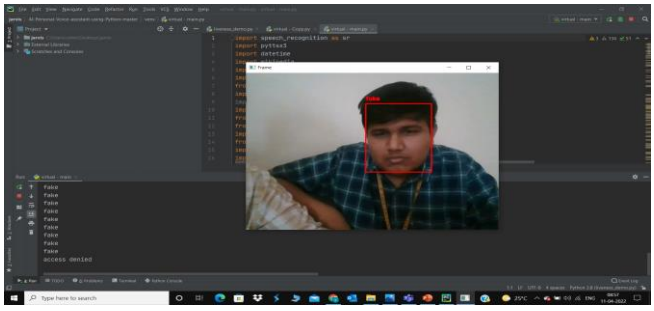

Fig 6: Result image.

we showed that if the user was unable to satisfy face verification or face recognition process. Then the software won't let the user to have access

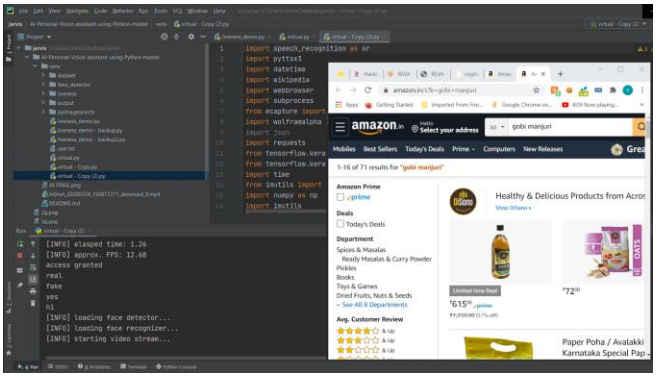

Fig 7: Result image.

we showed that if the user was able to satisfy both face verification and face recognition process. Then the software will grant access to user and execute the given task

VI. CONCLUSION

In our paper, we concluded that there is so much lack of privacy issues using voice assistance in day-to-day life. The voice-based assistants available in the market are not having an interface for face authentication or a security system to authorize the user to prevent unauthorized access. So, we focused to build a voice assistant application that can safeguard itself from unauthorized access by using face authentication where the user needs to pass a two-level authentication process. Whenever a user passes a command to voice assistance it will check the input of voice command, then categorize it into unauthorized or authorized. If the command is unauthorized (for accessing sensitive or personal information) then the application will implement a face verification and face recognition process by taking the user's face to decide whether the user is authorized or unauthorized. If the user is authorized, it will execute the user command if not it won't execute the user command.

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HEAR-IT - Uncovering Emotions

Sathish G C

Harish Naidu Gaddam

Likhitha S

Thejesh Manduru

Manohar Kommi

Department of CSE

Bangalore Karnataka, India

Sathish.gc@reva.edu.in

harish.naidu0207@gmail.com

likhitha.srirangam@gmail.com

thejesh.m2000@gmail.com

kommimanoharnaidu@gmail.com

Abstract: SPEECH EMOTION RECOGNITION (SER) is that the act of trying to acknowledge human feeling an therefore the associated emotive states from speech. This takes advantage of the actual fact that tone and eat the voice of times mirror underlying feeling. In recent years, feeling recognition has been a chop-chop growing analysis domain. Machines, not like humans, lack the power to understand and specific emotions. However, by implementing automatic feeling recognition, human-computer interaction may be improved, reducing the necessity for human intervention. During this project, basic emotions like calm, happiness, fear, disgust, so on area unit extracted from emotional speech signals. We have a tendency to use machine learning techniques like the Multilayer Perceptron Classifier (MLP Classifier) that is employed to classify the given information into nonlinearly separated teams. The MLP classifier is trained mistreatment MEL, MFCC, CHROMA, and MEL options extracted from speech signals. To accomplish this goal, we have a tendency to use Python libraries like Librosa, sklearn, pyaudio, numpy, and soundfile to analyse speech modulations and acknowledge feeling.

Keywords*:* SPEECH EMOTION RECOGNITION, *MLP, MFCC, CHROMA, MEL, Librosa, Pyaudio, RAVDESS, SAVEE.*

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1. INTRODUCTION

AI for emotion detection and analysis, often known as "affective computing," is a branch of artificial intelligence that focuses on human emotion recognition and analysis. Machines with this level of emotional intelligence are capable of grasping not just the cognitive channels of human communication, but the emotional channels as well. This provides children with the capacity to perceive, evaluate, and respond correctly to both verbal and nonverbal cues in a variety of situations. Researchers are putting in significant effort to teach robots to identify and understand human emotions, with which the field has made significant progress. Machine learning and deep learning are two technologies that are particularly important in this situation. In combination with these technical breakthroughs, images and speech recognition systems are utilised as inputs for the machines, which are then processed by the machines. Consequently, the robots learn to detect and interpret a grin or shift in tone of voice, such as whether it is a joyful or sad smile, for

instance. It has an influence on whether or not the current condition is better or worse than it was in the prior scenario. According to the researchers, characteristics such as skin temperature and heart rate are also being experimented with at this time. They are useful in the development of wearable devices that are as intelligent as possible, among other things.

2. RELATED WORK

[1] [2] They suggested a method that uses Random Deep Belief Networks to figure out what people are feeling based on what they say, which encapsulates the ensemble learning strategy used in the RDBN method for distinguishing emotions from voice data. The random subspaces technique was used once the input voice stream had been stripped down to its bare essentials. In this case, each random subgroup is supplied into the DBN input to capture the greater characteristics of the i/p file, which is after fed into the basic algorithm to obtain a projected mood classification. Additionally, each emotion label output is fused by a clear majority to create the final emotion tag for the given audio signal.

[3] [4] [5] They suggested the use of a feeling detection mechanism in conjunction with a deep learning approach. Despite the fact that large amounts of acoustic emotional data are used to describe emotions.

[9] suggested an emotion identification technique based on neural networks that focuses on distinguish emotions from a given i/p audio stream using NN Algorithms. They recommended an elevated pass filter as the first step in this strategy.

[10] In this article, the author projected a method for recognising negative emotions in the Thai language using deep learning. They used two 2-D convolutional neural networks (CNNs) and trained their models individually using the RAVDESS, TESS, SAVEE, and Crema-d datasets. Finally, they evaluated their model using the Thai dataset.

[11] In this author's project, using attention head fusion is used to increase the accuracy of emotion identification in speech. They used the head fusion approach to create a feature with MFCCs as input characteristics to construct an ACNN algorithm for emotion recognition in speech. They confirmed their findings by examining the IEMOCAP database, which includes information on 4 emotions (angry, sad, excited, and neutral).

[12] projected a method for identifying emotions in speech called "Direct Modeling of Speech Emotion from Raw Speech." They used a mixture of CNN and LSTM. They extracted characteristics from raw speech using parallel convolutional layers with variable filter lengths.

[13] proposed speech emotion identification starting with a log Mel spectrogram, the researchers utilised the Librosa package to extract features from it. These characteristics were then used to create textures on the time and frequency axes by utilising two concurrent convolutional layers. As a result, an 80-channel model is divided into 4 convolutional layers, which would then be provided in the fifth layer. As a consequence, the attention layer responds to the representation and conveys the findings to the fully connected layer, which is responsible for ultimate emotion categorization. In addition, a great deal of research has been done utilising SVM and its combination approaches to date.

[14] However, for voice emotion classification, we combined random subdomains, MLP, and CNN to build an ensemble teaching model. Additionally, the optimal model for SER has not been investigated.

3. METHODOLOGY

In this case, we will partition our database into 2 parts: training and testing. After making a partition of our database, we'll load it and execute 2 processes: first, we'll extract the dataset's features, and then we'll use a range of classifiers to determine the particular emotion reflected by the i/p audio file. After training and testing our model, then feature extraction and then implementing the classifier on the data is integral to maintaining that the classifier is as precise as possible. Whichever classifier has the best accuracy, we need to save it in order to implement it using the Flask framework. The user may deliver the audio file using this web application. This web application will connect to the recommended model and use the given audio sample to determine the exact emotion. It will then play music in accordance with the emotion found in an attempt to lift the user's mood.

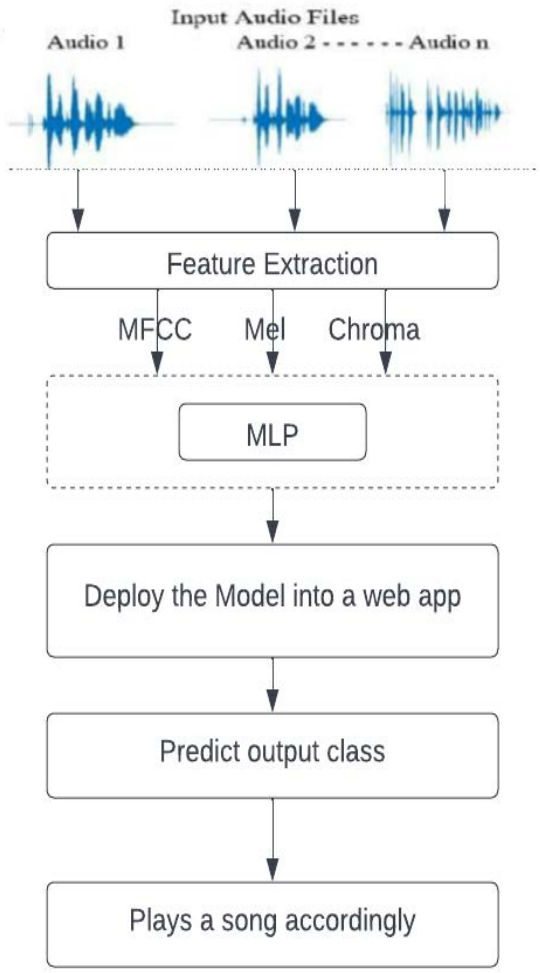

Fig 1 : System Architecture Diagram

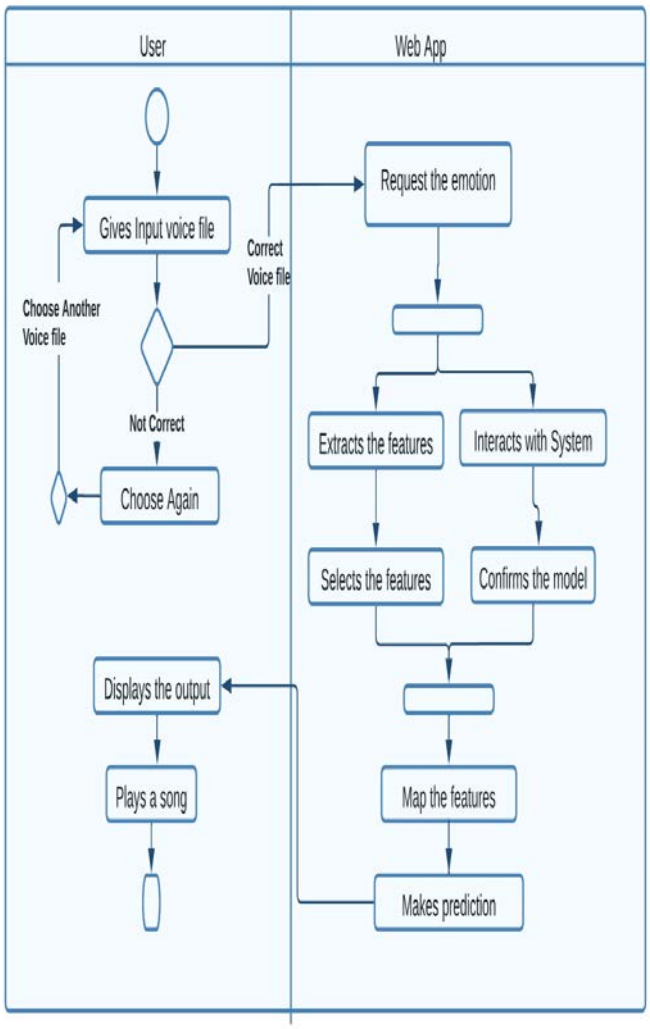

Fig.2 Activity Diagram

In the fig 2 indicates that the user first submits an audio clip file through the web application. By clicking on the Predict button and providing the appropriate voice input file, the user may request an emotion from the online server model. If the candidate i/p file is erroneous or if the user selects an unsupported voice file, the user must choose another supported and suitable voice file. After submitting the appropriate input file, the user may query the web application for the emotion associated with that particular voice input file. The web application communicates with the system and saves the given input voice file, takes features from it, and retrieves the stored model. The web application maps the selected data to a certain emotion using the previously stored model and then returns the information for the given input audio clip that was entered into the system.

2. Extraction of Characteristics

In this case, transforming our supplied i/p audio recordings to programmed data as the models will be unable to grasp the data. To evaluate these artefacts, we leverage the librosa package, which has different packages for collecting characteristics from an acoustic file's data. We investigate the MFCC characteristic since it is the most useful and vital approach to do so. It does so by examining the transmitter's short-term power spectra rather than its long-term prospective. The second feature considered is the Mel feature. The 3rd feature that is looked at is the Chroma feature.

The ZCR characteristic is used to figure out how quickly a certain frequency changes sign over the course of a frame, and the Rms characteristic is used to figure out how loud the wav file is.

3. Selection of Feature

Every one of these qualities are assessed in respect to the source audio clip's frequency, pitch, and intensity. We need not analyze every aspect of the MFCC to get satisfactory results. To do this, we evaluate Mfcc's top tier characteristics; then evaluate 12 Chroma characteristics, 128 Mel characteristics, 1 Zcr characteristic, and 1 Rms characteristic. A range of 182 characteristics are being evaluated, which includes identifying and picking 182 characteristics from every file, including them all to the x list, adding all of the emotions to the y list, and transforming the x list to array called q, providing it to the model through train test partition. We are also examining the following characteristics: Where p is the impartial characteristic, and y represents the heavily reliant characteristic, which encompasses emotions.

4. Developing a web-based Application

We created a web application using the Flask framework. Flask is free and open-source software that makes applications run on a server. Flask includes a templates folder, which is a static directory in which we may keep the HTML, CSS, Java Script, and image files for our web application.

4. SYSTEM REQUIREMENTS

TABLE I

Software	Hardware
OS: Windows 7 ABOVE. Coding Language: Python.	System: Intel i3 2.4 GHz and above.
IDE: Visual Studio Code	Hard Disk: 100 GB.
Front End: HTML/CSS, Flask.	Monitor: 15 VGA Colour RAM: 4 GB.

5. OBJECTIVES

- The primary goal of this project is to improve the interaction between humans and machines.
- Building a website with an excellent user interface and functionality.
- Deliver clean and accurate Emotion detection, Plays a music that is associated with improving the mood of the individual whose emotion has been recognized.

6. APPLICATIONS

- Interaction between humans and computers.
- Autonomous vehicles and smart home automation.
- Medical – Psychiatrists, Autism Spectrum Disorder.
- Hear It software takes advantage of music's inherent mood-lifting properties to aid individuals in improving their mental health and overall well-being.

7. CONCLUSION

By developing this project, we can utilise machine learning to recognise the emotion in speech, which may then be used to improve human-computer interaction. This method may be used to improve virtual voice-based assistants who can comprehend human emotions and respond accordingly, as well as in marketing and enhancing customer service in contact centers. With this approach, we acquire an approximate accuracy of roughly 80%. We utilised the MLP classifier approach for recognising emotions in this research, as well as speech as input. We discovered that MLP models worked better than others, and we used the Flask framework to deploy that MLP model into a web application.

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DATA ANALYSIS USING ML ALGORITHMS AND VISUALIZATION USING POWER BI

B M Akanksha
Bhavana Y M
Bhavana Y M
Mandara CM
Enosh Abhishek M

Computer Science Engeneering
Reva University
Bengaluru,Karnataka
r18cs071@cit.reva.edu.in
r18cs542@cit.reva.edu.in
r18cs110@cit.reva.edu.in
mandara.cm@reva.edu.in
r18cs125@cit.reva.edu.in

***Abstract* —** Data analysis is a totally urgent task to be achieved to ad lib the general execution utilizing past data. This might be made less muddled by means of the utilization of records representation gear like Power BI. The main role of this task is to acquire the best result of unsurprising precision of the dataset. The proposed framework is exceptionally gainful in business intelligence.Data insight gadgets provide a simple way to view and manage examples, inconsistencies, and models in data..They rejuvenate information.The overall goal of the study is to look at how large supermarket discounts are evaluated using an AI perspective. A superior dynamic process necessitates the synchronisation of BI and Big Data Analytics.Organizations all around the world are rapidly evolving, and businesses have realised that they are responsible for more than just selling records or organised data that must be handled, utilised, examined, and completed. Clients, items, representatives, and organisations will all be investigated through to understand why, what, and how they are, use BI and Big Data Analytics linked to agreements. In any case, we're trying to figure out how associations can live up to these expectations in this study.

Keywords— part, organizing, style, styling, embed

1. INTRODUCTION

In the present period Data analysis assumes a colossal part in creating different fields.In the present economy associations are feeling the squeeze to acquire upper hand to arrive at business objectives and to make due on the cutthroat business sectors. Thusly, it is basic to settle on in time choices in light of dependable and precise data.It can be utilized to foresee improved answers for a beneficial future, henceforth fulfilling the client/client needs.The fundamental and chief procedure utilized in forecast is the measurable strategies, which is otherwise called the customary strategy, which is time it are conveyed .Visualizations make the examination more easy to use Ease of Use to consume so AI methods. In the present economy associations are feeling the squeeze to acquire upper hand to arrive at business objectives and to make due on the serious business sectors. Thus, it is basic to go with in time choices in view of dependable and precise information.Many organisations use business intelligence to improve their dynamic capabilities, study corporate data, perform data mining, develop reports, and improve functional abilities. Various organisations use Business Intelligence to improve their dynamic capabilities, break down business information, execute data mining technique, develop reports, and work on functional skills.

In the present period Data investigation assumes a gigantic part in creating different fields.In the present economy associations are feeling the squeeze to acquire upper hand to arrive at business objectives and to get by on the cutthroat business sectors. Subsequently, it is basic to pursue in time choices in view of dependable and exact information.It very well may be utilized to foresee improved answers for a beneficial future, thus fulfilling the client/client needs.

The fundamental and preeminent strategy utilized in forecast is the factual techniques, which is otherwise called the conventional technique, which is time it are sent to consume so ML methods.Representations make the investigation more easy to understand.

2. LITERATURE SURVEY

[1] data science will examine past information (patterns or examples) and construct future expectations. BI will work with decipher past information.Information plays a crucial role in the growth of any company since it allows for the creation of more work, as well as proper planning and execution. Information-based decisions have a high chance of succeeding and can aid in the growth of the company.Business expertise, as well as information analysis, aids in the breakdown of data in order to recognise deteriorating experiences. Information is at the heart of both BI and information science. Microsoft's Power bi is a tool for conducting business analysis. It aims to

provide end users with a simple to use interface that allows them to see and analyse company data, as well as create their own reports and dashboards..

[2] Sales determining is exceptionally fundamental for each promoting organization. With the right forecast of interest, organizations might control selling plan before hence keep away from superfluous misfortune and increment benefits.
We've recently used plenty of non-straight anticipating systems, Support vector machines, for example, are Artificial Neural Networks (ANN) (SVM), AI models, and so on, in the hopes of improving determining precision. In any case, nonlinear systems have a worse deciphering capacity than time series models.

[3] Machine Learning might be a strategy that grants machine to be told from its past ability and further develop bring about future.It helps in PC to without composing any code, just by information taking care of to obtain the outcome .Machine anticipate the outcome in view of the put away information in machine. while creating model, the machine further develops the outcome in light of the change new information in machine. For expectation,AI makes use of advanced models and computational rules. These models include precognitive models and brain network-based models, both of which are used by systems to make basic decisions. AI can be used in a variety of fields, including sales and marketing, clinical areas, clinical consideration conclusion, manufacturing, and finance, to name a few.

[4] The consequences of review are addressed diagrammatically and may be utilized for additional examination of the market and send off of most recent product. Shut circle give chain utilizing reverse operations and information mining plans offers promising possibilities in this area. The AI calculations will quite often wreck the exhibition of expectation, consume lot of assets and by and large stoppage the standard in view of numerous boisterous and immaterial factors, especially in enormous datasets. to stay away from these issues, it's significant to pick A suitable variable inside the ML application.

[5] In maintaining a business, information the executives might be an important strategy that must be done by companies. With right information the executives, clients will get added worth, as legitimate data to help the dynamic cycle which will build adequacy and effectiveness in activities. bi will work with organizations inside the information the board strategy to give better information representation and detailing, that is useful for direction and rising administrations for the organization's business.

[6] This paper assisted comprehending the role of big data in increasing corporate value through business data and massive data analysis. The lack of smart gigantic information sources, adaptable continuous examination skills, and access to a practical stockpiling subsystem of elite execution are the basic tests of big data inquiry.

[7]Reinforcement learning is one of the absolute first ways to deal with execute specialist gaining from communication. From the get go, this strategy was not broadly utilized because of its calculation intricacy, but rather as previously mentioned, with the critical expansion in figuring power This technique permits us to independently show specialists without tremendous datasets, but instead give us a method for making exceptionally successful specialist model with least measure of information.Such models have a wide range of applications in real-world scenarios, ranging from personalised marketing to mechanical innovation, science, traffic and self-driving vehicles, and all the way to the gaming industry.

[8]Power BI includes a number of tools that help bridge the gap between data bases and accounting sheets, accounting sheets and estimate instruments, and data analysts and the mounds of data they'll have to sift through to find stories to share with partners, board members, and the general public.You need to make an information model cautiously by having more novel fields so that Power BI doesn't befuddle the connections with regards to complex connections Analysts can now utilize a simple business knowledge instrument to separate source information, make a dataset, change or control the information, picture the information and distribute the subsequent reports and dashboards without requiring IT association.

[9] This article mostly reviews ongoing information representation works, according to information the board point of view. They have exhaustively depicted the works in representation determinations, effective techniques for information perception, and perception proposal. Anyway a large number are as yet experiencing the proficiency and proposal issues of these frameworks.

[10]In this report, Gartner evaluate the highlights and abilities that separate the different items in this market and shows how the item vision, the experience of deals and the client experience of Microsoft devices added to elevated degrees of consumer loyalty . Business knowledge has developed from past information the executives frameworks, for example, information warehousing. As organizations battle to acquire an upper hand, BI offers the possibility to further develop independent direction and further develop productivity. In any case, numerous associations have as of late gone through monstrous interests in ERP frameworks which guaranteed an incorporated information climate — it is even important to leave many asking why BI.

[11] The concentrate in this paper is a stage towards laying out a pattern to plan standards to empower the seat checking of ML models which assume a basic part and have comparative application targets. The errand presently

remains is to observe the ideal situation for use of right MD and appropriate strategies for involving something similar in the most productive demonstrating cycle and prompting the ideal ML model.

3. COMPONENTS

HARDWARE REQUIREMENTS:

- Internet connection-Required
- Operating system-Windows7 or later
- Processor-intel Pentium 4 or later
- Memory-2 GB minimum,4 GB recommended
- Hard drive for Backup

SOFTWARE REQUIREMENTS:

- PythonIDE
- Jupyter
- Power BI

4. PROBLEM STATEMENT

To find out which ML algorithm is more efficient and gives better result with least error values .
Analyse the data using python via jupyter notebook.
The primary goal of business knowledge is to assist independent decision-making and corporate growth.As a result, we'll create a prescriptive analysis report with Power BI.
In this project we will be addressing the problem of data analysis and visualisation, which would be a very difficult task as per the traditional methods. The former is feasible and more accurate, whereas latter is time consuming and complex.

5. METHODOLOGY

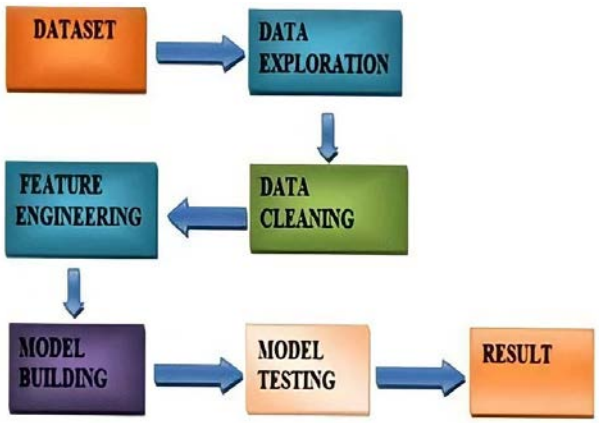


Fig 1

A. Dataset:
One of the most essential periods of any exploration project is information assortment. A compelling model can anticipate precise outcomes by tracking down accurate experiences of information. We involved wide market deals information as a dataset in our work where the dataset comprises of 12 ascribes. These characterize the fundamental highlights of the information which is being estimated. These characteristics are separated into Answer Variable and indicators. Here we use dataset which contains 8523 things spreading over different areas as well as urban communities. Store-and item level speculations are the fundamental elements on which our dataset centers around. Properties like region, populace thickness. ability of the store, area and so on has been remembered for store level. The primary goal of business intelligence is to assist independent direction and corporations in expanding their responsibilities. As a result, we'll use Power BI to create a prescriptive examination report.

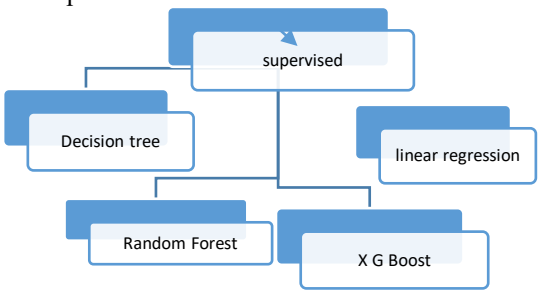
Finally, the data is divided into two parts: planning and testing. We used Big Mart's 2013 deals information as a dataset as part of our investigation. The dataset contains 12 ascribes, including Thing Fat, Item Type, Item MRP, Outlet Type, and Item Visibility. Outlet Identifier, Outlet Size, Outlet Establishment Year, Outlet Location Type, Item Identifier The response variable among these qualities is the Item Outlet Sales property, while the excess properties are used as pointer factors. There are 8523 portions in the educational record from various metropolitan communities and places.

B. Data Exploration:
In Data Exploration stage significant information should be additionally investigated from the crude dataset. In information investigation stage we distinguish the missing worth ascribes values as Nan or zero as least worth, which impacts the expectation precision. Such fields should be rectified prior to taking care of to the model henceforth an information cleaning system is utilized to deal with such qualities in the following segment

C..Data Cleaning:
In Data Exploration stage it is observed that the missing qualities credits are Outlet Size and Item Weight. For our situation we supplant every one of the missing qualities by the mode and mean of the comparing characteristic as per their sort, which decreases the relationship among input credits.

D.Feature Engineering:
A few subtleties were seen in the dataset during information investigation stage. This stage is utilized to determine all such irregularities found in dataset preparing it for building the prescient model. We saw that Item predictable property has a zero worth, essentially which has barely any clue. So the mean worth thing predictable of that item is utilized to supplant zero worth ascribes which makes all items prone to sell. Adjusting into acceptable ones settles any outright distinctive variations. Properties of non-consumables and fat substances are rarely expressed. To avoid such situations, we create a third type of Item fat substance: none. As indicated by the Item Identifier trademark, the noteworthy ID begins with either DR, FD, or NC. As a result, we create a new great thing type with three categories: food variations, beverages, and non-consumables. Finally, we add a trademark Year to the data to determine how old a certain outlet is.

E. Model Building :
A model is constructed utilizing different ML calculations like Linear regression,decision tree Random Forest regressor, and XG sponsor calculations. These calculations have been applied to foresee the end-product of deals



detail

Fig 2

F.Model Testing:
The capacity to recognize model results is a significant element of the assessment measurements. Here, we utilized Root Mean Squared Error (RMSE) metric for assessment process. RMSE is the most ordinarily involved assessment technique for relapse issues. The force of 'square main drivers this measurement to show critical variety in rates.

G. Result:
Our model expectations assist large shops with refining their techniques and methodologies which thusly assist them with expanding their benefit.

6. IMPLEMENTATION

Name	Type	Subtype	Description	Segment	Expectation
Item_Identifier	Numeric	Discrete	Unique Product ID	Product	Low Impact
Item_weight	Numeric	Continuous	Weight of product	Product	Medium Impact
Item_Fat_Content	Categorical	Ordinal	Wether the product is low fat or not	Product	Medium Impact
Item_Visibility	Numeric	Continuous	% of total display area in store allocated to this product	Product	High Impact
Item_Type	Categorical	Nominal	Category to which product belongs	Product	High Impact
Item_MRP	Numeric	Discrete	Maximum Retail Price (list price) of product	Product	Medium Impact
Outlet_Identifier	Numeric	Discrete	Unique Store ID	Store	Low Impact
Outlet_Establishment_Year	Numeric	Discrete	Year in which store was established	Store	Low Impact
Outlet_Size	Categorical	Ordinal	Size of the store	Store	High Impact
Outlet_Location_Type	Categorical	Ordinal	Type of city in which the store is located	Store	High Impact
Outlet_Type	Categorical	Ordinal	Grocery store or some sort of supermarket	Store	High Impact
Item_Outlet_Sales	Numeric	Discrete	Sales of product in particular store. This is the outcome variable to be predicted	Product	Target

Table 1

To figure out which ML calculation is more effective and gives improved outcome with least blunder values .Break down the information utilizing python through jupyter journal. The excellent motivation behind business insight is to offer help in independent direction and assist the associations with developing their business. Subsequently we will utilize Power BI for creating a prescriptive examination report. In this undertaking we will resolve the issue of information examination and representation, which would be an extremely challenging errand according to the conventional strategies. The previous is possible and more exact, while last option is tedious and complex.

In our work, we use a 20-overlap cross-approval to assess the precision of several models. During the cross-endorsement stage, the dataset is divided into 20 subgroups with roughly comparable sizes for arbitrary reasons. Nineteen of the twenty subsets are used as readiness data, while the remaining subset approaches test data (otherwise called leave-one-out cross endorsement). Each model is created using arrangement data, then used to predict accuracy using test data, and so on, until each subset has been tried once.
When a predictive model produced from any directed learning relapse technique is applied to the dataset, the interaction is supposed to information score. The above model score plainly deduces about Data Scoring. The likelihood of an item's deals to rise and sink can be talked about and perceived based on specific boundaries. The weaknesses related with an item or thing and further its deals are likewise fundamental and assume a vital part in our critical thinking task. Further, a client confirmation system ought to be utilized to keep away from access from any unapproved clients and subsequently it are safeguarded and gotten to guarantee all outcomes. Following the completion of previous cycles, the dataset is now ready to be used to build the suggested model. In this study, we present an Xgboost-based model and compare it to existing AI approaches such as Linear backslide [14], Ridge backslide [8.16], and others.There may be several types of fundamental examples in the raw data, which provide inside and out information about the subject of interest as well as personal encounters with the issue. In any case, information should be viewed with caution since it may contain invalid qualities, repetitive qualities, or various types of ambiguity, necessitating the pre-handling of information. In this fashion, the dataset should be studied as thoroughly as possible. By quantifiable measures, different factors are significant.

Implementation Machine learning Algorithms

1.Linear Regression: It can be named as a parametric method which is utilized to anticipate a persistent or subordinate variable on premise of a gave set of autonomous factors. This
procedure is supposed to be parametric as various suspicions are made on premise of informational collection.To deal with overfitting, it employs proportionally lower processes, regularisation, and cross-approval.

2. Decision tree: It is an instinctive model having low canisters and it very well may be embraced to construct an arrangement tree with root hub being quick to be considered in a hierarchical way. It is an exemplary model for ML.
The basic design of a decision tree is to break down a large amount of data into smaller chunks. The forecast is divided into two stages. The underlying stage is model preparation, which entails creating, testing, and improving the tree using existing data. The model is used to forecast a result in the following step.

3.Random Tree: It is a useful calculation for achieving adaptability and for identifying proof difficulties while constructing an approximated framework. The decisions are made with the goal of achieving the best possible outcome. Random forests, also known as random decision forests, are an ensemble learning method for classification, regression, and other problems that works by training a large number of decision trees. Random Forest operates in two stages: first, it consolidates N selected trees to create arbitrary forests, and then it makes forecasts for each tree created in the first step.

4. XGBoost: XGBoost represents outrageous Gradient Boosting. The execution of the calculation was designed for the proficiency of figuring time and memory assets Boosting is a consecutive cycle in light of the guideline of the outfit.
XG Boost comes under the Ensemble techniques of Random forest. It is a well-known and productive open-source implementation of the inclination assisted trees calculation. Inclination assisting is a controlled learning computation that attempts to predict an objective variable by precisely mixing multiple variables. the evaluations of a number of simpler, more fragile models.XGBoost stands for “Extreme Gradient Boosting”

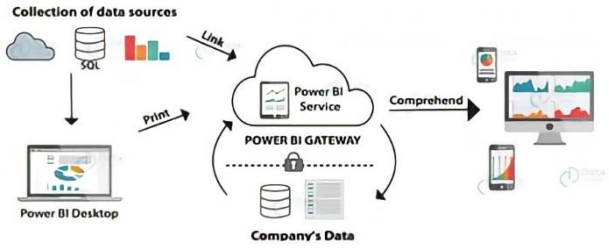


Fig 3: Implementation of Power BI

Power BI is a collection of programming groups, apps, and connectors that work together to transform inconsequential data into useful, outwardly engaging, and intelligent experiences.
To make the dynamic more visible, the programme processes the data so that it is sensible, reliable, and large. Power BI can be used to manage all aspects of a business, including streamlined duties, HR, client partnerships, financial exchanges, bargains, statistical surveys, and assembly procedures, to name a few.
Power BI is a collection of programming administrations, apps, and connectors that work together to transform disparate data sources into intelligent, visually appealing, and intuitive knowledge chunks.Many firms use business intelligence to improve their decision-making capabilities, analyse corporate data, execute data mining, create reports, and increase operational capabilities.

To deliver dynamic more straightforward, the program processes the information with the end goal that it is reasonable, solid, and significant. Power BI can be utilized to deal with all features of an organization, including planned operations, HR, client relations, monetary exchanges, deals, market examination, fabricating processes, thus on.
Power BI can be utilized to deal with all features of an organization, including coordinated factors, HR, client relations, monetary exchanges, deals, market examination, producing processes, etc.
In this project, we will be analysing our cleaned dataset using Power BI insights to create graphical visualisations. With the help of the above analysis, we will be creating prescriptive analysis report that will be helpful in improvising the business.

7. EXPERIMENTAL RESULT

ALGORITHMS	RMSE VALUES	MAE
Decision Tree	1086	27.6
Random Forest	1058	27.29
Linear Regression	1131	28.93
XGboost	188.6	16

Table 2

This is our experimental result where we have found the error values of all the algorithms. The one with the least RMSE and MAE value is XGboost.
Hence XGboost is the most efficient algorithm.

8. RESULT

Assessment of the model is the crucial piece of making a productive AI model. Hence, it is critical to make a model and get ideas from it with regards to measurements. It will take and go on until we accomplish great exactness as indicated by the worth got from metric upgrades. The capacity to recognize model results is a significant component of the assessment measurements. Here, we utilized Root Mean Squared Error (RMSE) metric for assessment process. RMSE is the most normally utilized assessment. technique for relapse issues. The force of square main drivers this measurement to show critical variety in rates.

Will track down the best of four calculations. Will have a superior comprehension of the ML calculations. Will find out about on request perception device: Power BI
Better comprehension of breaking down the information and creating a report to help the development of the organization.
The goal of this venture is to examine which Machine Learning Algorithm gives us an improved outcome with the least RMSE and MAE values. To break down the dataset utilizing perception instrument i.e, Power BI, and to create a prescriptive investigation report on something similar.

To conjecture Big Mart's income, easy to cutting edge AI calculations have been executed, for example, Linear Regression, Ridge Regression, Decision Tree, Random Forest, and XGBoost. It has been seen that expanded proficiency is seen with XGBoost calculations with lower RMSE rating. Subsequently, extra Hyper boundary Tuning was directed on XGBoost with Bayesian Optimization procedure because of its fast and genuinely straightforward calculation, which finished in the securing of the least RMSE worth and improving the model matched to the fundamental outcomes.

9. CONCLUSION

We are anticipating the exactness for a wide range of calculations yet XG Boost Regressor gives more compelling forecast. Our expectations assist enormous stores with refining their approaches and methodologies which thusly assist them with expanding their benefit. The outcomes anticipated will be exceptionally valuable for the chiefs of the organization to be aware of their deals and benefits. This will likewise give them the thought for their new areas or Center's of BigMart.

This undertaking gives us huge information about dissecting information in a wide range of ways, which thusly lets us know how significant Data Analysis is to the world.
We would've found out about Machine Learning Algorithms, python utilizing Jupyter journal and Power Bi. These innovations are utilized ordinarily in the Industry for ad libbing themselves. This makes sense of why we decide to do this undertaking and advance however much we can about these apparatuses and innovations

Numerous cases boundaries and different variables can be utilized to make this deals forecast more imaginative and effective. Precision, which assumes a key part in expectation based frameworks, can be altogether expanded as the quantity of boundaries utilized are expanded. Likewise, an investigate how the sub-models work can prompt expansion in efficiency of framework. The undertaking can be additionally teamed up in an electronic application or in any gadget upheld with an in-assembled knowledge by prudence of Internet of Things (IoT), to be more possible for use. Different partners worried about deals data can likewise give more contributions to help in theory age and more occasions can be thought about to such an extent that more exact outcomes that are nearer to true circumstances are produced. When joined with viable information mining strategies and properties, the conventional means should have been visible to make a higher and constructive outcome on the general improvement of partnership's assignments overall. One of the
features is more expressive relapse yields, which are more reasonable limited with some of exactness. Additionally, the adaptability of the proposed approach can be expanded with variations at an extremely proper phase of relapse modelbuilding. There is a further need of analyses for appropriate estimations of both exactness and asset proficiency to survey and improve accurately.

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Two-way communication for dumb/deaf using Machine learning and CNN

Vignesh R
Vinayak B Bidari
Vishal Mise
Geetha B

School of Computer and engineering
REVA university
Bangalore, India

***Abstract*--** For several reasons, there has been a casual rise in several dumb and deaf cases. The importance of communication for them is that they communicate through sign language. A gesture is used by the dumb and deaf to convey a message or an emotion to others, the main part of the movement is the torso, hand, and movement segment. The dumb and the deaf can communicate among themselves using sign language. But ordinary people find it difficult to communicate with the dumb and deaf, as they are not aware of those sign languages. Even the average person cannot effectively communicate using sign language with the dumb and deaf. The main aim of this paper is to provide an effective way in which there is 2-way communication with the common person, the dumb, and the deaf. The proposed model is an actual-time application for hand gesture recognition that recognizes indications and then converts gesture images into text or speech. This conversion will allow them what they want to communicate in no time. The sign-to-speech conversion is done using CNN. This application can prove to be an effective communication tool for dumb and deaf people to use in daily life. This application can prove to be effective in a video chat application for communicating things online.

Keywords- Deaf and dumb, Hand Gesture recognition, CNN, YOLO, Sign to speech, sign to words

1. INTRODUCTION

Each day recurring, we will communicate with each other with the use of speech and hand gestures to make others understand our thoughts. Gestures are a better and more natural way for humans to engage with computer systems, and as a result, it creates a richer bridge between humans and technology. Sign language translation is one of the most rapidly evolving fields of study in recent years, and it is by far the most natural mode of communication for those with hearing impairments. We have developed a system that automatically converts the Sign language to text and speech. We have developed a huge set of samples to get more efficiency and understand the difficult sign language gesture by using a digital camera. This system proposes a very effective and easy-to-use system for the dumb and deaf which helps in verbal conversation and learning. Sign language conversion is a very important line of study in recent times. There have been many studies showing some information about the conversation between dumb and deaf. The shape, placement, motion of palms, further facial expressions, body actions, each plan y vital thing carrying records. signal language is not a normal language — in the entire USA. It Has its very individual language, and areas have dialects, just like the many languages are spoken anywhere in the internationally talking language, the detection price through the ASL language as in compared to the linguistic accuracy is 90 % proportion of organizations generally use Indian sign language The proposed model is CNN primarily based value which the changes sign language to text and speech. Here CNN is used because of its high mapping than the other comparison methods. This is the main application this system focuses on which converts the signal to text or speech with 95% accuracy. The first system is to locate the signal language and convert it to text. the main method here is to 1) Setup a UI to take his or her to enter from the person 2) Next is to test and train the information acquired from the user 3) form words and 4) conversion of text to speech. In the developing version, we use four layers Convolutional Layer, Pooling Layer, fully related Lanard and very last Output Layer. This version will help convert the sign to textual content conversion. you can then use Google APIs to convert text to speech.

2. LITERATURE SURVEY

[1] The machine proposed in this article is entirely based on a creative and scientific approach to hand popularity, which is more general, safer, and now does not require a database to learn about specific gestures. Hand gestures should be identified in different lighting conditions. Feature extraction and classification methods require several methods, and it is difficult to choose which method to apply. The proposed technique performs background segmentation of the hand according to the obtained statistics and then assigns specific gestures to special alphabets. This entails a feature extraction strategy for top-level calculations and hand gesture ratio calculations, sooner or later the gestures will be recognized and converted to speech and vice versa. Speech recognition machines are used to convert acoustic speech into the form of gestures. [2In this article, this article presents a convenient and time-saving new online platform for the deaf designed for web and Android applications. The utilization is used as an effective means of communication and learning. This model has a scientific 4-level function. Receive speech with PyAudio, convert speech to text using Google Speech to textual content API (text content ionization and process text content using NLP ideas), store text into visual symbols, phrases, and a series of processed text content for the deaf and deaf Matching video when displayed to male or female. [3] The system proposed in this paper is designed to recognize several

very important sign language elements and convert them into text content and sounds. American Sign Language is a visible language. Along with gestures, thoughts use language statistics, both figuratively and predictably. Sign language is not a common language in all states. Has its own sign language 6 and has a native language in the area For example, as a globally spoken language, multiple languages are spoken everywhere and for checking grammatical accuracy, detection fees in ASL languages are typically 90% for establishments that use Indian Sign Language. In this paper, there is an analysis of different methods and their efficiency. The best method of the analysis I then used and produced an android application that converts the Sign language to speech and text conversion.[5] This paper suggests a method in which speech is converted to sign using Microsoft Xbox Kinect 360s and unity 3d models to communicate. This first speech is taken as input this is then converted to text using Google API. Then this input is fed to models which show the signs.[6] this paper will give us another method that will be used to convert sign to speech conversion using CNN.[7] In this paper, The sign to speech is converted using an SVM classifier. In this method, different sensors are used such as flex sensors, MPU6050 sensor, Arduino Nano, and HCO5 Bluetooth module to detect the hand gesture to speech. In this accuracy of the system is 98.91% is achieved for the ASL database with 25% test data and 75% training data.[8] In this paper, there is a comparison between many approaches to object identification, here in this paper YOLO v3, R-CNN, and SSD are compared. In this comparison the R-CNN has high MAP than any other method, this makes it a key component to use in this project. YOLO has a high detection rate but R-CNN has a high MAP which is a key feature.

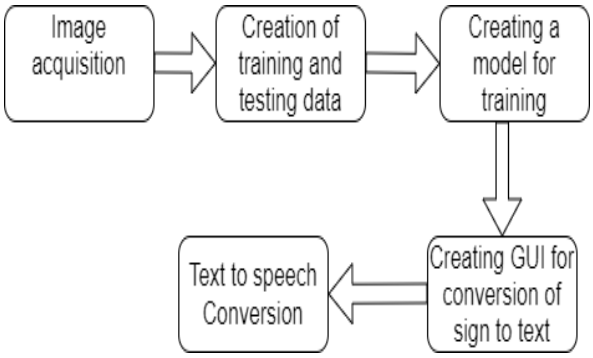
3. DESCRIPTION OF METHOD

SIGN TO SPEECH CONVERSION

First Process is to detect the sign language and convert it to text. The main process here is: 1) set up a UI to take his or her input from the user 2) Next is to test and train the data obtained from the user 3) form words and 4) conversion of text to speech.

A. Flow Diagram

This flow diagram explains the methodology of the project which is being implemented



Flow chart of the project

1) Image acquisition

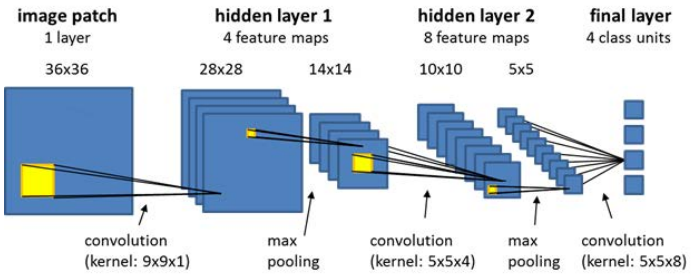
Image acquisition collects images linked to various sign languages. This contains all the alphabets, numbers, and other sign languages, which are all gathered and saved in a file. Approximately 600 to 700 photographs are shot for each sign.

2) Creation of testing and training data

Once the image has been captured, it must be separated into training and testing data. The image is gathered initially from the Region of Interest. These photos are then subjected to image processing to improve their accuracy.

3) Creating a model for training

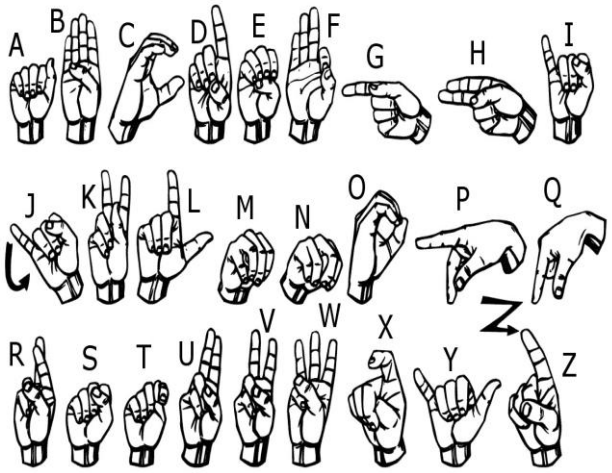
According to normal Neural Networks, there are three dimensions in neurons at CNN layers that are width, height, and depth. The neurons are not connected in a fully linked fashion but instead connected in the window size layer before it. By the conclusion of the CNN architecture, the output will be of several classes as we condense the full image into one vector of class scores. For creating the models, we use a convolutional layer for the input layer, and then further when we process two layers come into action that is hidden the first layer as well consists of 4 feature maps and the other one consists of 8 feature maps and the process continues further until we reach the final layer which contains the neurons that are like the images that are formed into more classes.



5) CREATING GUI FOR CONVERSION OF SIGN TO TEXT

During the training, we turned our RGB input photos to grayscale and removed unwanted noise with gaussian blur. Then the captured image of the hand is resized to 128/128 pixels. We then train and test the data model. The image obtained is classified and the result between 0 to 1 is obtained. The sum of each such classified value equals 1. We achieved this result using the SoftMax function. As the prediction layer's results will sometimes not get in a clear manner it is improved by using labeled data for the training of the models. For the classification purpose, we make use of cross-entropy. It is a continuous function that is positive when the value is not the same as the labeled value and zeroes when the value is the same as the labeled value.

As a result, we increased the cross-entropy as close to zero as feasible to maximize the cross-entropy. I modified the weights of my neural network in the network layer to get this result.



6) Text to speech conversion

After that, the text is transformed into speech using the Google API. This is presented as an option because this is a two-way communication system where the user can choose between text and speech conversion.

4. Mathematics behind CNN

In CNN the convolution layer is the very important layer. It has the main proportion of the computational load. This layer performs a dot product between two matrices.

If we have an input of size W x W x D and a Dout number of kernels with a spatial dimension of F, stride S, and padding amount P, we can calculate the size of the output volume using the formula:

$$W_{out} = \frac{W - F + 2P}{S} + 1$$

The pooling layer uses a summary statistic of neighbouring outputs to replace the network's output at specific spots. If we have an activation map of size W x W x D, a pooling kernel of spatial size F, and stride S, we can calculate the size of the output volume using the formula:

$$W_{out} = \frac{W - F}{S} + 1$$

IV. Results

The model is running with an efficiency of 95%. Hence this model proves to be very effective with the training and testing data can also be implemented for Indian sign language. This model gives us an effective way of sign languages. This model has more training and testing data sets than other papers mentioned which makes this model give more efficiency. This system can also be used to detect both American and Indian sign language. This system makes it unique from other systems as this can be used to detect other sign languages other than alphabets. This system can be used for a variety of other uses other than sign language because of its efficiency.

Correct \ Values	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
A	147	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	2	0	0
B	0	139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0
C	0	0	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	145	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0	0	0	0	0	135	0	0	0	0	0	4	0	0	0	0	0	1	0	0	2	10	0	0	0
G	0	0	0	0	0	0	150	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
H	1	0	0	0	0	0	7	143	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1
I	0	0	0	33	0	0	0	0	108	0	2	0	0	0	0	0	0	0	0	7	1	0	0	0	0
J	0	0	0	0	0	0	0	0	0	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L	0	0	0	0	0	0	0	0	0	0	0	153	0	0	0	0	0	0	0	0	0	0	0	0	0
M	0	0	0	0	0	0	0	0	0	0	2	0	152	0	0	0	0	0	0	0	0	0	0	0	0
N	0	0	0	0	0	0	0	0	0	0	0	0	0	152	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	154	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	153	0	0	0	0	0	0	0	0	0
Q	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	147	1	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	0	0	0	0	0	0
S	0	0	0	0	1	0	0	0	0	0	0	0	0	1	10	0	0	0	132	0	0	0	0	8	0
T	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	151	0	0	0	0	0
U	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	115	0	0	0	0
V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	1	0	0
W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	149	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	148	0
Y	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151
Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Algo 1

5. Conclusion

This application helps the dumb and deaf to communicate with others very effectively. As this is a two-way communication this will allow effectively communicate with others. This model is having 95 % efficiency which makes the model very effective, and the UI is also good where the user can communicate with. This can also be used for Indian sign language if we train with a lot of amounts of training and testing datasets. This system can be used for a variety of other use cases.

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Comparative Analysis Of Cryptocurrency Price Predictionusing Machine Learning

Prof.Mandara CM
D.Lalitha
B.Bhuvaneswari

School of CSE
REVA University
Mail:mandara.cm@reva.edu.in

School of CSE
REVA University
Mail:R18CS123@cit.reva.edu.in

School of CSE
REVA University
Mail:R18CS075@cit.reva.edu.in

Abstract— Bitcoin is a digital currency that is well-known for its innovative payment network. It is not controlled by a central structure or bank. This paper plans to precisely anticipate the Bitcoin cost by considering different boundaries that impact the Bitcoin esteem.We found the advantages and disadvantages of bitcoin expectation by social occasion data from different reference papers and applying it continuously. Following the recent boom and bust of cryptocurrency prices, Bitcoin has become increasingly regarded as an investment asset. Although previous studies have used machine learning to predict Bitcoin prices more accurately, few have focused on the feasibility of using different modelling strategies.In this paper,We attempted to accurately forecast the Bitcoin price by taking into account several aspects that influence the Bitcoin value. We aimed to analyse and detect daily fluctuations in the Bitcoin market as well as get insight into the most relevant characteristics surrounding Bitcoin pricing in our work. We will make the most accurate daily price prediction possible.

***Keywords*—** Bitcoin, cryptocurrency,Machine learning,prediction,decisiontree,linear regression,svm ,Knn.

1. INTRODUCTION

The value of Bitcoin fluctuates in the same way that the value of any other stock does. Many algorithms are used to forecast stock market prices using stock market data. However, the factors influencing Bitcoin differ. As a result, forecasting the value of Bitcoin is necessary in order to make sound investment decisions. Unlike the stock market, the price of Bitcoin is unaffected by business events or intervening government authorities. As a result, we believe that using machine learning technology to estimate the price of Bitcoin is vital.Bitcoin is an electronic cash that is involved from one side of the planet to the other for cutting edge portions and as a hypothesis.Bitcoin is decentralised, which means it is not owned by a single entity. Bitcoin transactions are straightforward since they are not tied to a certain jurisdiction. Investing in bitcoin is possible through a number of "bitcoin exchanges" or marketplaces. These can be utilized to trade Bitcoins in an assortment of different monetary standards. Mt Gox is the fundamental Bitcoin exchange. Bitcoins are put away in a computerized wallet, which works similarly as a virtual ledger. The record, everything being equal, as well as the timestamp information, is put away on a site called Blockchain. Each record on a blockchain is alluded to as a square.A pointer to the past square of data is associated with each square. The data put away on the blockchain is encoded. During exchanges, simply the client's wallet ID is unveiled, not the client's name. Many investigations utilized web-based entertainment AI calculations to anticipate the cost of bitcoin on the financial exchange.We predicted the bitcoin price in our project utilising svm,decision tree,linear regression,knn machine learning methods. Our goal is to evaluate the effectiveness of four algorithms.

Our Contributions

In our exploration, we applied the most modern AI calculations to anticipate the cost of a Bitcoin with more noteworthy precision**.**

2. LITERATURE REVIEW

A significant measure of writing on Bitcoin cost forecast has previously been distributed and is accessible to the overall population in this area.Lekkala Sreekanth's prediction of Bitcoin utilising Deep Learning in the year 2020 is one such paper. He proposed the SVM model in his work, which stands for support vector machine. The advantage of utilizing this model is that it functions admirably when the quantity of aspects surpasses the quantity of tests, yet the drawback is that it is slow.

In 2019, Yogeshwaran delivered a paper named Bitcoin Price Prediction Using Deep Learning. He involved CNN and RNN in his article.

The benefit of utilising this model is that it can quickly determine pricing for vast datasets. The disadvantage is that, both forward and backward, convolution is a substantially slower operation than, example, maxpool.

Shreya Maji's "Bitcoin Price Prediction Using Machine Learning" is one of the articles in which she discusses Bayesian Regression and GLM.

The advantage of adopting this algorithm is that it works by utilising the coinmarkup cap to anticipate the outcome, and the negative she highlighted in her paper is that filtering the data takes a long time.

3. SYSTEM REQUIREMENTS:

Software Requirements	Hardware Requirements
Jupyter notebook, the data set	
Libraries:Scipy,pandas, NumPy, sklearn, and Matplotlib.	

4. PROPOSED METHOD

In this paper we have utilized two AI calculations irregular svm,linear regression,decision tree and knn

anticipate the cost.

Our study's dataset was obtained from the Kaggle website. The dataset also has 10 columns and 2991 rows, as can be seen. Open, close, high, low, and volume are all options. A cryptocurrency's open price is the price at which it trades at any given time (start of the day). A cryptocurrency's closure price is the price at which it closes at a certain point in time (end of the day). The volume of a coin is the number of times it changes hands in a given time period (no.of transactions happened in a day). This is the most exorbitant cost of the day. low: the least expensive cost of the day.

1.Support Vector Machine Algorithm:

SVM represents Supervised Machine Learning Algorithm, and it is utilized for order and relapse.It's all the more normally utilized for order, in spite of the fact that it's similarly great for relapse.

Steps:

1.Install the required libraries first.

2.Split the X and Y variables after importing the dataset.

3.Separate the dataset into training and testing sections.

4.For the first time, set up the SVM classifier model.

5.Determining the parameters of the SVM classifier model.

6.Creating forecasts is number six on the list.

2.K-Nearest Neighbour Algorithm:

Knn is a condensing for "k-closest neighbor." It's an AI calculation that is administered. It tends to be utilized to handle issues including arrangement and relapse. The letter 'K' addresses the amount of nearest neighbors to another dark variable that ought not set in stone.Its goal is to figure out whatclass a new or unknown data point belongs to by locating all of its nearest neighbours. It's a method based on distance.

The stages in the KNN method are as follows:

Stage 1:Settle on the amount of neighbors (K).

Stage 2:Choose the Euclidean distance between K neighbors.

Stage 3:Utilizing the got Euclidean distance, find the K closest neighbors.

Stage 4:Count the amount of information of interest in each class among these k neighbors.

Stage 5:Appoint the new data centers to the arrangement with the best number of neighbors.

Stage 6: Our model is prepared.

3.Linear Regression Algorithm:

A supervised learning machine learning approach is linear regression. Regression analysis is performed by it.

It's a popular tool for forecasting and determining variable correlations. Different relapse models take a gander at various sorts of reliant and autonomous variable connections, as well as various quantities of free factors.

A mathematical approach called linear regression is used to estimate the value of a dependent variable (y) based on the worth of an autonomous variable (x). A straight connection between x (information) and y (yield) is found because of utilizing this relapse procedure (yield). The expression "straight relapse" became far reaching subsequently

4.Decision Tree Algorithm:

A decision tree creates relapse or arrangement models as a tree structure. It separates a dataset into increasingly small lumps over the long run while likewise assembling a decision tree. A tree with leaf hubs and choice hubs is the final product.

Steps:

1.The first step is to bring the libraries into the programme.

2: Entering data into the programme.

3: Using the dataset, create a Training and Test set.

4: Train the Decision Tree Regression model on the preparation set.

5: Predicting the Results

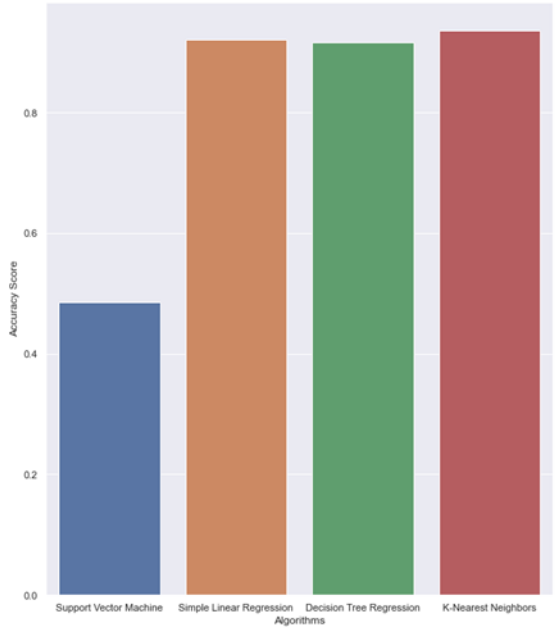
6: Actual and Predicted Values Comparison.

5. RESULTS AND DISCUSSION

We have taken the dataset from the Kaggle.Our dataset contains 7 features open,close,high,low, volume,date and symbol.we have taken close as target variable.we have trained and tested the data. Then we have implemented the algorithms which are SVM,linear regression,decision tree,knn.

```
#accuracy score of SVR
print("Accuracy score of SVR : ",svr_rbf_confidence)
#accuracy score of simple linear regression
print("Accuracy score of simple linear regression : ",reg_confidence)
#accuracy score of decision tree regression
print("Accuracy score of decision tree regression : ",dtreg_confidence)
#accuracy score of knn regression
print("Accuracy score of KNN regression : ",knnreg_confidence)
```

```
Accuracy score of SVR :  0.48500510292946897
Accuracy score of simple linear regression :  0.9212752708485761
Accuracy score of decision tree regression :  0.9159561181658946
Accuracy score of KNN regression :  0.936084026083408
```



We have comapared all the four algorithms with their accuracy.KNN gave 93% accuracy,linear regression gave 91% accuracy,decision tree gave 91% accuracy and svm gave 48% accuracy.So with this we got to know that KNN algorithm is more efficient for bitcoin price prediction.

6. CONCLUSION

In this paper we talked about how AI calculations used to anticipate the costs of bitcoin with the connected charts which gives us representation of how information is addressed execution of those calculations alongside result.After implementing four algorithms we got to know that the KNN gave the highest accuracy .

7. FUTURE ENHANCEMENTS

Since we can't determined 100% accuracy score for our system model that predicts Bitcoin price. However, achieving a 100 percent accuracy score indicates that our model is being overfitted with data, resulting in performance that has already been trained for it.We can imrove on this accuracy by using deep learning algorithms however at cost the cost of computation expense.We can also use complex Machine Learning models to get better accuracy in prediction of Bitcoin value or price.

In any event, it is necessary to investigate further to work on the accuracy of Machine learning-based expectation models by considering other boundaries in addition to the previous one. The value unpredictability of cryptographic money is influenced and determined by factors like as a country's governmental structure, advertising, and market strategy. Other cryptographic types of money, such as wave, ethereum, light coin, and others, were not examined in our analysis. We'll improve the concept by applying it to these cryptographic kinds of money, making it more stable.

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Comparative Analysis on Fully Adaptive Routing Algorithm and Pseudo Adaptive Routing Algorithm for E-RiCoBiT(Enhanced-Ring Connected Binary Tree)

[1]Bollamma MP , [2]CH Diveni, [3]Divya D , [4]Chinmay AS, [5]Dr. Sanju V

School of CSE, REVA University

Abstract.

Owing to the current happenings in the world, it is said that there may come a time in future, where a billion transistorASIC(Application Specific-Integrated Circuit)might be usedto enhance the performanceof various systems leading to High Performance Systems.Taking this into considerationas an important objective, it is realized that High Performance Systems are becoming an integral part of our day to day life. Earlier, single core systems were designed using the normal bus architectures but today multiple coresystems are used instead so as to run many applications. But still the thirst of having to use as many cores as possible on a single chip is still not over. This problem can be resolved bybuilding a chip based on an important concept called Network On Chip(NOC). It ispurely a network oriented technologyused for communication between the nodes of a chip. So this paper is proposed mainly to use the Network On Chip(NOC) concept to present two routing algorithms namely, Fully Adaptive Routing Algorithm and Pseudo Adaptive Routing Algorithm thereby comparing theirabsolute outcomes. The idea of building a chip using many coresin order to attainthe goal of High Performanceis getting competitive day by day.Pertaining to the project, while arranging the nodes in a particular topology, we have used RiCoBiT which is known tohave achieved the highest performance so far. Achieving scalability, abiding and implementing the concept of Network On Chip(NOC) and comparing the analysis of the aforesaid routing algorithms are the important aspects which accounts to this paper.

Keywords. Performance Systems, Network on Chip, Routing algorithms, RiCoBiT Topology

1. INTRODUCTION

In our day to day life there seems to be a significant necessity to use different kinds of electronic inventions. The communication between the chip composites are known to be the basis of this aim. The significant communication that occurs when a packet is being transferred from a given source to destination and the behavior of the packet transferal is being elaborated here. The type of routing algorithms on the basis of which a device workshas to meet different kind of requirements.The major need to satisfy the expected

results is attained by using the two routing algorithms- Fully Adaptive and Pseudo Adaptive respectively. Hence different kinds of routing algorithms have been implemented. The big concern that holds here is whether the algorithm meets our expected desires or not. There are certain essentials based on which the concept of Network On Chip implementation works. There are in fact two such essential requirements known as Performance Requirements and Architectural Requirements. As the name suggests, the Performance requirements are small latency(delays), assured throughput, the ability to take up a different path in case there are any broken nodes, strong transfer capacity and limited amount of power consumption. Coming to the Architectural requirements namely, high performance, generality and configurability. The ability of tolerance against faults or disturbances are also said to be relied on the Quality of Service.

In this competitive ongoing current world the aspect of accuracy holds a lot of weightage in fact that is one of the main objectives of building any electronic integrated chip. The accuracy that we meet through our implementations are the ones which prove that our chip is capable of High Performance. Implying on the topology which we have used here is one of the most important facets. The RiCoBiT Topology is the main probability on which we study the communication and behavior of the packet being transferred from source to destination. The ring connection in binary tree theory says that packet travels in the form of nodes based on implying around the given source and destination.This RiCoBiT topology has a beautiful architecture which is elaborated further. The inventions of today's various innovations solely rely on the design and implementation which is proposed in this paper accurately.

2. LITERATURE SURVEY

[1] Sanju. V and Niranjan Chiplunkarproposed a springerpunconf paperwhich explained the concept of RiCoBiT Architecture needed for Network-on-chip based Systems. In this, they have given a clear cut picture on RiCoBiT Topology, how the addressing is done and finally the non-adaptive routing algorithm implementation respectively.In addition they have proved the efficiency of RiCoBiT by giving a comparison of each of the performances of various other topologies based on determining the maximum Hop Count, maximum Hop(Average case), number of wire segments and wire lengths. Further, they have also discussed real-time parameters like latency and throughput.

[2] C. Koushika, R. Sharmili and Sanju. Vproposed a paper known as "Design and Implementation of a network on chip-based simulator : a performance study" in the year 2014 which shows the simulator design and implementation. The verification and testing is also shown distinctly. So here the implementation of the simulation is used to help describe the characteristics and the internal working of the topologies. Based on the analysis performed, it is proved that RiCoBiT is outstandingly efficient compared to mesh and torus topologies.

[3] Niranjan Chiplunkar and Venkata Krishna, Sanju. V had proposed a "Routing in Network On Chip-A Review" paper to discuss the various topologies involved in the concept of NOC namely-bus, mesh, torus, RiCoBiT, tree, butterfly and polygon. Further the strategies in routing and the problems that might come up during routing were also

discussed. The major view on how Network on Chip concept acts as a back bone in the case of high performance integrated circuits is also briefly elaborated.

[4] Ville Rantala, Teijo Lehtonen and Juha Plosila proposed " Network On Chip Routing Algorithms" which very briefly explains the various topologies on Network on Chip, the flow control of the routing algorithm and the problems that come up on routing as well. Here a vast description on the Router Architectures is also provided.

3. PROPOSED MODEL

As the name of the paper suggests, a comparative analysis between pseudo adaptive and fully adaptive routing algorithms are made which are used in this Network on Chip based Systems. A tremendous topology called RiCoBiT is being used here to make sure that the nodes communicate with each other smoothly. In this scenario, there are a number of nodes connected to each other in the form of a ring. In addition, each node of the previous ring is connected to two other nodes of the next ring, thereby successfully forming a binary tree, hence the name Ring Connected Binary Tree.

Now to proceed further, let's see the working of the project. To begin with, nodes in the chip are placed RiCoBiTically for a smooth network communication. Now when dug deep into the concept, let's see how communication really takes place between the nodes. Suppose, we consider that a packet is being sent from a source node to a destination node and we see how efficiently the packet reaches the respective destination. We check whether the packet has reached successfully without any delay or not. We also note that there is a definite throughput and also the time taken by the packet to reach the destination. Now to proceed further, there is also a need to check whether the packet reaches the destination even if there are issues or difficulties during the process. Such issues which interrupt during the communication are termed as "Broken Nodes". Hence the need for a packet to adapt the quality of path diversity and guaranteed throughput is very significant. Such quality parameters are being proved through the absolute outcomes as shown in the results given below. Here, we have shown a comparative analysis on scenarios based on all that is, zero broken nodes, one broken node and two broken nodes respectively.

This paper ensures us good scalability and prevents any routing algorithmic problems concerned.

Design Objectives

The best network communication is attained by working out these possible affirmations as follows :

- Performance requirements which is massive requirement that is small latency, absolute throughput, path diversity, sufficient transfer capacity and low power consumption.
- Data communications between segments of chip are packetized and transferred through the network.

Routing Algorithm

The design of the topology plays a very important aspect as it directly proportional to the data communication that occurs between the nodes of the chip. Hence formulating the algorithms on the basis of topology must be precise and accurate. To make a comparative analysis we have designed two kinds of algorithms namely- fully adaptive and pseudo adaptive routing algorithms. Let us learn further on how they work.

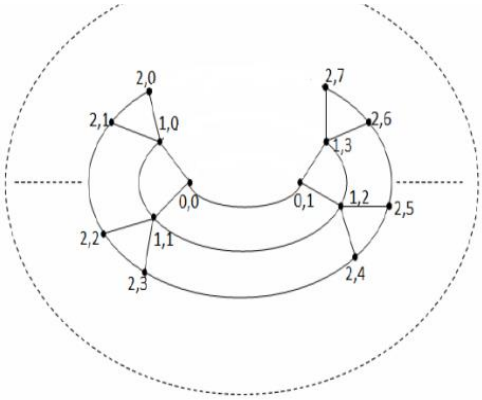

Figure 1: E-RiCoBiT Topology.

Coming to the types of routing algorithms which we have used here, there are certain affirmations that needs to be discussed further. TheFully adaptive routing algorithm and the pseudo adaptive routing algorithm play a significant composite while building a chip which yields maximum scalability. In addition, it also prevents any kind of routing problems which might come up during the respective network communication.

In the aforesaid RiCoBiT topology, after deciding the number of rings (k), further there are three cases yet to be decided wherein the packet has to be traversed from source to destination. The three cases to be configured are as follows :

1. One source to one destination(1:1)
2. One source to all destinations(1:n)
3. All sources to all destinations(n:n)

The probability of the packets reaching the destinations while using any other topologies is quite less. But in RicoBiT it is assured that there will be a guaranteed throughput.

After determining the case in which our packet will be traversed, then the nodes pertaining to that case will be concerned next.

4. RESULTS

Considering the significant aspects of the paperconcerned, it appears that the type of topology used that is E-RiCoBiT, adversely effects the performance of the chip advantageously. Thus we draft out the various nodes concerned according to their coordinates through three cases involved and the results are noted thereafter.

High Performance as a main objective is being laid out through these outputs as shown below. The parameters namely total time, average time, maximum time and the path are being extracted successfully and a primitive comparison is made between the two that is fully adaptive and pseudo adaptive routing algorithms effectively.The varied outcomes of each scenario gives a meaningful insight about the differences of the two routing algorithms respectively.

Here are the three main cases illustrated with their specific type of algorithms:

Fully Adaptive Routing Algorithm based on all the three cases-

[1]One source to One Destination

[2]One source to All Destinations

[3]All sources to All Destinations

Through either zero broken node, one broken node or two broken nodes respectively.

LEVEL NUMBER	SOURCE NODE	DESTINATION NODE	BROKEN NODE	ONE SOURCE TO ONE DESTINATION			
				TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	(1,1)	0	13	12	13	2 1
2	(2,1)	(2,3)	0	34	32	34	6 5 4
3	(3,3)	(3,7)	0	76	72	76	14 6 5 4 10
4	(4,6)	(4,14)	0	138	132	138	29 14 6 5 4 10 21
5	(5,12)	(5,18)	0	200	192	200	59 29 14 6 5 4 10 21 43

Fig. Fully Adaptive(one source to one destination)(no broken node)

LEVEL NUMBER	SOURCE NODE	DESTINATION NODE	BROKEN NODE	ONE SOURCE TO ONE DESTINATION			
				TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	(1,1)	(1,1)	1	0	1	2 1
2	(2,1)	(2,3)	(2,2)	51	48	51	6 2 1 4
3	(3,3)	(3,7)	(2,3)	94	90	94	14 13 12 11 10
4	(4,6)	(4,14)	(3,7)	160	154	160	29 28 13 12 11 10 21
5	(5,12)	(5,18)	(4,14)	248	240	248	59 58 28 13 12 11 10 21 43

Fig. Fully Adaptive(one source to one destination)(one broken node)

LEVEL NUMBER	SOURCE NODE	DESTINATION NODE	BROKEN NODE	ONE SOURCE TO ONE DESTINATION			
				TOTAL TIME	AVG TIME	MAX TIME	PATH
2	(2,1)	(2,3)	(1,0)(2,0)	34	32	34	6 5 4
3	(3,3)	(3,7)	(2,3)(1,1)	94	90	94	14 13 12 11 10
4	(4,6)	(4,14)	(3,7)(2,1)	160	154	160	29 28 13 12 11 10 21
5	(5,12)	(5,18)	(4,14)(2,2)	272	264	272	59 58 18 13 12 11 10 21 43

Fig. Fully Adaptive(one source to one destination)(two broken nodes)

LEVEL NUMBER	SOURCE NODE	BROKEN NODE	ONE SOURCE TO ALL DESTINATIONS			
			TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	0	13	13	13	2 1
2	(2,1)	0	135	27	50	6 5 4
3	(3,3)	0	573	44	76	14 6 5 4 10
4	(4,6)	0	2348	80	138	30 14 6 5 4 10 21
5	(5,12)	0	7537	123	200	62 30 14 6 5 4 10 21 43

Fig. Fully Adaptive(one source to all destinations)(no broken node)

LEVEL NUMBER	SOURCE NODE	BROKEN NODE	ONE SOURCE TO ALL DESTINATIONS			
			TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	(1,1)	0	0	0	-
2	(2,1)	(2,3)	101	20	34	2 1 4
3	(3,3)	(2,2)	569	43	95	14 6 2 1 4 10
4	(4,6)	(3,5)	2344	80	138	30 14 6 5 4 10 21
5	(5,12)	(4,8)	7423	121	200	62 30 14 6 5 4 10 21 43

Fig. Fully Adaptive(one source to all destinations)(one broken node)

LEVEL NUMBER	SOURCE NODE	BROKEN NODE	ONE SOURCE TO ALL DESTINATIONS			
			TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	-	-	-	-	-
2	(2,1)	(1,0)(2,0)	85	17	34	6 5 4
3	(3,3)	(2,3)(1,1)	527	40	94	14 13 12 11 10
4	(4,6)	(3,5)(2,1)	2394	82	138	30 14 6 5 11 10 21
5	(5,12)	(3,7)(4,8)	7612	124	249	62 30 29 28 13 12 111 10 21 43

Fig. Fully Adaptive(one source to all destinations)(two broken nodes)

ALL SOURCE TO ALL DESTINATION

LEVEL NUMBER	NO OF BROKEN NODES	BROKEN NODE	TOTAL TIME	AVG TIME	MAX TIME
1	0	0	26	6	12
2	0	0	782	13	48
3	0	0	8094	22	90
4	0	0	68218	39	154

Fig. Fully Adaptive(all source to all destination)(no broken node)

ALL SOURCE TO ALL DESTINATION

LEVEL NUMBER	NO OF BROKEN NODES	BROKEN NODE	TOTAL TIME	AVG TIME	MAX TIME
1	1	-	-	-	-
2	1	(1,0)	627	13	64
3	1	(2,3)	7888	24	126
4	1	(4,9)	65296	39	154

Fig. Fully Adaptive(all source to all destination)(one broken node)

Pseudo Adaptive Routing Algorithm based on all the three cases-

[1]One source to One Destination

[2]One source to All Destinations

[3]All sources to All Destinations

Through either zero broken node, one broken node or two broken nodes respectively.

LEVEL NUMBER	SOURCE NODE	DESTINATION NODE	BROKEN NODE	ONE SOURCE TO ONE DESTINATION			
				TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	(1,1)	0	12	3	12	1 2
2	(2,1)	(2,3)	0	32	3	32	4 5 6
3	(3,3)	(3,7)	0	72	3	72	10 4 5 6 14
4	(4,6)	(4,14)	0	132	3	132	21 10 4 5 6 14 2 9
5	(5,12)	(5,18)	0	120	0	120	43 21 10 4 5 6 14 29 59

Fig. Pseudo Adaptive(one source to one destination)(no broken node)

LEVEL NUMBER	SOURCE NODE	DESTINATION NODE	BROKEN NODE	ONE SOURCE TO ONE DESTINATION			
				TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	(1,1)	(1,1)	1	0	1	-
2	(2,1)	(2,3)	(2,2)	48	5	48	4 1 2 6
3	(3,3)	(3,7)	(2,3)	90	5	90	10 4 5 12 13 14
4	(4,6)	(4,14)	(3,7)	154	3	154	21 10 4 5 6 13 28 29
5	(5,12)	(5,18)	(4,14)	120	0	120	43 21 10 11 24 49

Fig. Pseudo Adaptive(one source to one destination)(one broken node)

LEVEL NUMBER	SOURCE NODE	DESTINATION NODE	BROKEN NODE	ONE SOURCE TO ONE DESTINATION			
				TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	(1,1)	(1,1)	-	-	-	-
2	(2,1)	(2,3)	(1,0)(2,0)	32	3	32	4 5 6
3	(3,3)	(3,7)	(2,3)(1,1)	90	5	90	10 4 5 12 13 14
4	(4,6)	(4,14)	(3,7)(2,1)	154	3	154	21 10 11 5 6 12 28 29
5	(5,12)	(5,18)	(4,14)(2,2)	120	0	120	43 21 10 4 1 2 6 14 13 28 58 59

Fig. Pseudo Adaptive(one source to one destination)(two broken nodes)

LEVEL NUMBER	SOURCE NODE	BROKEN NODE	ONE SOURCE TO ALL DESTINATIONS			
			TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	0	24	24	12	1 2
2	(2,1)	0	224	44	32	4 5 6
3	(3,3)	0	1044	80	92	10 4 5 6 14
4	(4,6)	0	4356	150	132	21 10 4 6 14 30

Fig. Pseudo Adaptive(one source to all destinations)(no broken node)

LEVEL NUMBER	SOURCE NODE	BROKEN NODE	ONE SOURCE TO ALL DESTINATIONS			
			TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	(1,1)	0	0	0	-
2	(2,1)	(2,3)	192	38	32	4 1 2
3	(3,3)	(2,2)	1080	83	90	10 4 1 2 6 14
4	(4,6)	(3,5)	4488	154	132	21 10 4 5 6 14 30

Fig. Pseudo Adaptive(one source to all destination)(one broken node)

LEVEL NUMBER	SOURCE NODE	BROKEN NODE	ONE SOURCE TO ALL DESTINATIONS			
			TOTAL TIME	AVG TIME	MAX TIME	PATH
1	(1,0)	-	-	-	-	-
2	(2,1)	(1,0)(2,0)	160	32	32	4 5 6
3	(3,3)	(2,3)(1,1)	1088	77	90	10 4 5 12 13 14
4	(4,6)	(3,5)(2,1)	4576	157	132	30 14 6 5 11 10 21

Fig. Pseudo Adaptive(one source to one destination)(two broken nodes)

LEVEL NUMBER	NO OF BROKEN NODES	BROKEN NODE	TOTAL TIME	AVG TIME	MAX TIME
1	0	0	48	24	12
2	0	0	1472	49	48
3	0	0	15336	84	90

Fig. Pseudo Adaptive(all sources to all destinations)(no broken nodes)

5. CONCLUSION

The brief description on Network On Chip is given along with the topology being used. The optimal routing algorithms used to make a comparative analysis are also mentioned. The performance analysis proves that RiCoBiT topology is the best topology that can be used in this scenario. Whereas other topologies are a bit disadvantageous and can also have routing problems concerned. So RiCoBiT makes sure that the packet takes up the shortest length there is and also assures that any kinds of routing problems are prevented. The maximum scalability and the assured throughput are the basic advantages provided. The concept of adaptiveness increases the efficiency of routing by making sure that the packet has different directions to traverse through in order to reach the destination thereby lessening the amount of time taken by it to reach. By this, we conclude that the paper provides a vast analysis by comparing the efficiency of two routing algorithms- fully adaptive and pseudo adaptive while using RiCoBiT topology for a perfect kind of network communication to take place.

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Real-Time Conversion of Haze Into Haze-Free Images And Videos

[1] Pavana Shivaram, [2] Meenakshi.Sundaram. A

Computer Science & Engineering, REVA University

[1]Pavanashivaram10@gmail.com, [2]meenakshi.sa@reva.edu.in

Abstract.

Weather is a major factor in outside photography and computer vision. Fog, sunshine, and smoke obscure images and videos captured by a camera because they obscure the contrast among them. In this study, a new real-time dehazing method is proposed. We can estimate the ambient light and extract the clear picture objects from a single input image using approaches like the dark channel prior and the depth map. Our solution outperforms previous methods in terms of both performance and processing time. It is possible to utilize the proposed method to monitor vehicles from the outside and make them smarter.

Keywords. Dark channel prior, bilateral filter, depth map, dehaze

1. INTRODUCTION

When photographing under adverse weather conditions, light is dispersed and absorbed, and this light is also homogenized with light reflected from multiple directions, known as the airlight, which returns to the camera. [1]. As a result of this technique's reduced use of color and sharpness, the final image lacks a realistic quality to it.

Fog, smoke, dust, rain, snow, and other types of precipitation can all generate undesirable visual effects in photos and movies. These abnormalities in event detection may have a significant impact on surveillance from the outside and ADAS technologies (advanced driver aid systems). Hazing artifacts have been found to have a significant impact on the performance of image/video compression, reducing the transmission and storage capacity of digital visual information. As a result, the removal of weather effects (also known as "de-weathering") from images and films has become increasingly important and has attracted considerable interest. Our primary focus in this study is on a single image for haze removal (or dehazing).

In order to construct the MSRL-DehazeNet, a deep learning method for removing background haze from a single image, numerous scales of residual learning were used

(MSRL). Aside from the end-to-end mapping of hazy images to their clear counterparts, we re-frame this problem as a restoration of the image's basic component. To map haze-free base components to the haze- freebase components, an image can be dehazed using multiscale deep residual learning and simplified U-Net learning. Another convolution neural network that has been training or education can then be used to enhance the specific component (CNN). For more effective feature extraction, features are transferred to the next layer using CNN architecture and reduced U-Net structure. Consequently, color distortion in the restored image is avoided. Achieved images and movies that are clearer and more detailed because of the haze-removed improved detail component.

2. RELATED WORK

Runde Li utilized images acquired from the same scene with varying polarisation levels in [1]. This filter may be ineffective when the scene is dynamic since it is tied to a camera. It is impossible to use this technique since it is restricted to static situations in [2]Yu Zhang's work because several images are shot in various weather conditions.

When Xiao Sun divides the scene radiance into surface shading and subsequently extracts transmission, he does so where the transmission and surface shading are not connected. Haze images produced by Tengu Yu's factorial Markov random field model are susceptible to color distortion for this. To clear the haze, S. Narasimhan uses photos with improved visibility to restore the image [5]. It's easier to see the findings, but they may be skewed by the saturation and hence not be true to reality.

In [6] "Visibility in poor weather," Clear weather is the ideal environment for current vision systems. There is no avoiding "bad" weather in any outside application. A computer vision system must include methods that allow it to work (even if slightly less reliably) in the presence of haze and fog as well as other weather conditions. To begin, we examine how various weather situations seem visually. We use what we currently know about atmospheric optics to do this. Next, we'll look at ways in which terrible weather might benefit us. Visual information coding may be understood in terms of atmosphere modulating how information is sent from a scene point to the viewer. In light of these findings, we create models and strategies for recapturing relevant images.

'Vision and the atmosphere' may be found in [7]. Visual information coding may be understood in terms of atmosphere modulating how information is sent from a scene point to the viewer. We use two fundamental scattering models and create methods for recovering relevant scene attributes, such as three-dimensional structure, from one or two photos obtained in poor weather. Our next step is to simulate and test the chromatic effects of air scattering. These geometric limitations are derived from this chromatic model, which explains how weather conditions affect the color of a scene. As a result of these restrictions, we've developed algorithms that can compare these two or more images taken under distinct but unknown weather circumstances to determine the hue of fog or haze, segment depth, and extract three-dimensional structure.

"Vision and rain" occur in [8]. Rain has a variety of visual effects. Rain causes pictures and videos to shift dramatically in intensity, which can have a negative impact on outdoor vision systems. The visual impact of rain and the different elements that

influence it are examined in this research. Based on these findings, we've been able to create very efficient algorithms for dealing with rain in computer vision and portraying rain in computer graphics that are photorealistic. Photometric models characterize the intensity of individual rain streaks while dynamic models capture the Spatio-temporal features of rainfall. We begin by developing these two models. Together, these models depict the whole range of rain's visual qualities. A simple and effective post-processing technique for the identification and removal of rain from movies is developed using these models. ' In this study, we show that our technique can differentiate between rain and other time-varying textures such as intricate scene object motion. Our investigation is then reinforced by examining the effects of various camera parameters, rain characteristics, and scene brightness on how rain appears. As a result of the rain's small size, fast velocity, and wide dispersion, its visibility may be seriously impacted by the camera settings. Rain may be reduced during image collection by setting camera parameters with care, using this dependency. Camera settings can also be used to make rain more apparent. This capability may be exploited to create a reduced, portable rain gauge based on a camera that can measure the rate of rain in real-time. It's at this point that we create a rain streak appearance model that takes into consideration the raindrop's quick form distortions (or oscillations). These distortions allow us to accurately describe the complex intensity patterns evident in the case of raindrops that are near to the camera.

As stated in "Video-based automated incident detection for smart roads: the outside environmental issues with false alarms," AID systems are becoming more common in intelligent transportation systems[9]. In contrast, video-based AID’s precision is heavily influenced by environmental factors such as shadows and intensity. The ability to perceive environmental variables such as static shadows, snow, rain, and glare has been studied in the literature. By adapting to the external environment, video-based AID systems will be better at detecting warnings. To close existing detection gaps in outdoor environmental circumstances, this study will draw on the reviewed literature to suggest new research options. It's expected that in the future, video-based AID systems will be more reliable and hence more widely used. New algorithmic methods for recognizing environmental elements that affect the AID system's accuracy are also suggested by this study.

The most common negative of these methods is the lack of speed for videos, which is the most common drawback.

An improved real-time video and picture dehazing algorithm is presented in this paper. The outcomes are better since the processing time is greatly decreased.

3. METHODOLOGY

A) BACKGROUND

Direct attenuation and light going through the scattering medium and being distributed in various directions are two expressions used to create a hazy image. Attenuation is influenced by two, namely the medium and the depth of field. Air-light is

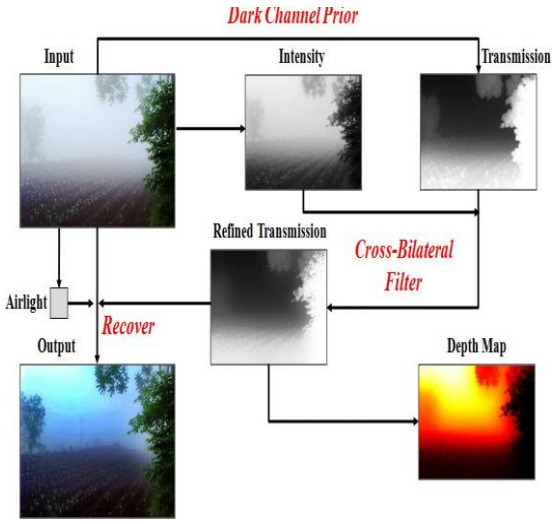
the term used to describe the scattering of light from other directions. The model may be described using the following equation.

$$A(x) = b(x) * C(x) + (1-b(x)) * D$$

A represents the acquired picture of haze, B represents the image without haze we want to restore, D represents the ambient light, and b represents the transmission medium that characterizes the light that isn't dispersed and gets to the camera. x represents the location of the pixel in this equation. The original haze-free image can be restored using this formula. The scalar value of transmission, which runs from 0 to 1, gives the product the depth information of the objects. Let us suppose that the medium is homogenous, and we can calculate the transmission as follows:

$$b(x) = e^{-\beta d(x)}$$

where β indicates the scattering coefficient of the medium with the depth scene d



B). SINGLE-LAYER IMAGE DEHAZING

Rough transmission analysis, cross-bilateral filter smoothing, and picture recovery are the topics of this chapter.

1). EXTRACTION OF TRANSMISSION BY USING DARK CHANNEL PRIOR

First, the airlight transmission map should be removed so that the stunned image may be recovered. In this instance, we're intending to use the dark channel that used to be there. For the vast majority of non-sky areas, at least one color channel will have low intensity at some pixel points. It is imperative that the intensity of such a patch be reduced to a minimum. Consider that a pixel in picture C has a dark channel value of [x]

$A^{dark}(x) = \min_{c\in\{r,g,b\}} (\min_{y\in\Omega(x)} (A^c (y)))$

Ac is a color channel of A, as shown. Assume that a dehazed image has a dark channel value of zero because it should be extremely low. Assume that t is the transmission time of a local patch. As a consequence, the hazy imaging model follows as follows.

$\min_{c\in\{r,g,b\}} (\min_{y\in\Omega(x)} (Ic(y) / A^c))$

$= t\tilde{}(x) \min c\in\{r, g,b\} (\min y\in\Omega(x) (Jc(y) Ac))$

The above equation will handle both sky regions and other regions.

Searching is divided into rows and columns using the CNN algorithm. It uses two buffers and three comparisons per pixel to convert it into a pass. Because of this, each pixel comparison requires no and over 8 comparisons in all. Because of this, the dark channel is proportional to the size of the image. We utilize a patch size of 11 X 11 in our implementation

2) REFINEMENT OF THE TRANSMISSION IMAGE USING BILATERAL-FILTER

The refining process is sped up by using an edge-preserving filter in this procedure.

Dual Filtering is a non-linear filtering method that maintains the strong edges to capture the strong edge and outline a picture's profile while removing any block that affects the original image. cross-border filtering is used to ensure seamless transmission. tr(x) stands for refine transmission and may be calculated:

$t(x) = 1\ w(x) \sum y\in\Omega(x)\ G\sigma s\ (\|x - y\|)\ G\sigma r\ (|Ex - Ey|)t\tilde{}(x)$

The Gaussian function is G. There are two weights: sigma S is the weight of space and sigma R the weight of range. The input image's intensity E is used to calculate the range weight, and the weight of the local patch is added to get w(x).

$w(x) = \sum y\in\Omega(x)\ G\sigma s\ (\|x - y\|)\ G\sigma r\ (|Ex - Ey|).$

Using Paris and Durand's signal processing method to recast the calculation. Then, trilinear interpolation and division are applied.

3) RECOVERY OF THE HAZE-FREE IMAGE

In order to reassemble the haze-free image C, we will need to change the transmission map.

$C(x) = A(x) – D \max(t(x), t0)/+ D$

The transmission can only go back to a certain period, t0. As a result, the final free picture C may be found using the following technique.

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4) ESTIMATION OF THE AIR-LIGHT

As a surrogate for air-light, we use the pixel's dark channel value that is the highest. Techniques like linear mapping and gamma correction can be used to enhance the look in the future.

4. EXPERIMENTAL RESULTS

i)Subjective Results on Hazy images:

On the basis of these findings, we tested the suggested technique on real-world photos, including some of the most demanding natural photographs. When applied to real-world foggy photos, our technique yields superior dehazed images with improved retention of features and color information.

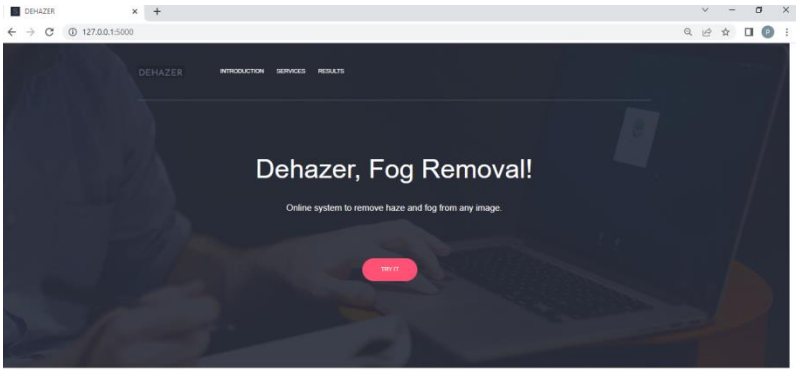
ii)Hazy Images: Quantitative and Qualitative Results

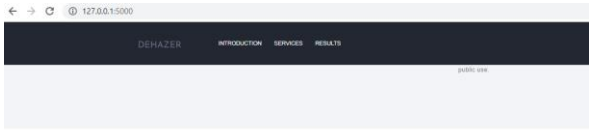
The original dark channel prior-based method, which is also a deep learning-based methodology, is compared to evaluate how well it works in terms of quantitative performance evaluation. Note that we employed three different sets of images for our tests: SOTS, OTS, and the High-Sensitivity Test Set (HSTS) (Synthetic Objective Testing Sets).

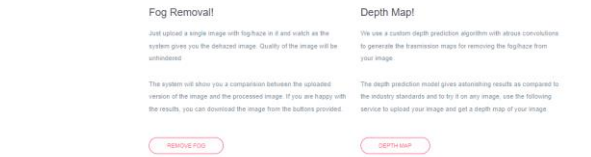
iii)Pre-processing and Problem Formulation:

Our earlier image decomposition frameworks were the inspiration for this approach, which uses image filtering to divide an input fuzzy image into two parts: the base component and the detail component. As a result of the dehazing process, delicate details may well be lost.

A lightweight network structure can be achieved by first decomposing an image into its most basic and most detailed components and then developing an in-depth model to learn a wide range of haze-related image properties.







FOG REMOVAL RESULT

Fog removed from a picture with humans

HAZE REMOVAL RESULT

Haze removed from the background of the image

FOG REMOVAL RESULT

Fog removed from an image of a forest.

5. CONCLUSION

In this paper, we have proposed a method to retain the image's color information by extracting the haze-relevant structural and statistical picture properties from the base component. The data sets have been collected from Kaggle. Nonlinear regression-based picture enhancement preserves the real features of the picture. Data from tests show that single picture dehazing approaches perform similarly in terms of dehaze removal performance and computing complexity.

In future work, we will focus on the haze removal of the real-time images and videos using an unsupervised algorithm wherein we will propose a new method of haze removal for untrained data sets.

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DMDY: Detection of Marine Debris Using YOLOv5

Arpitha P K, Aishwarya S S, Asha B, Anusha C V and Dr. AshwinKumar U Motagi

School of CSE, REVA University, Bangalore, India

arpi2205@gmail.com, ssaishwarya229@gmail.com, ashabejawada@gmail.com, anushacv123@gmail.com, ashwinkumar.um@reva.edu.in

Abstract.

The Industrial revolution has led to a drastic change in human lives. It has served as both boon and bane to us. It was a great form of prosperity to humans. But with this prosperity it also carried so much pollution which led to environmental degradation. One of these pollutants is marine waste that is segregated into oceans in large volumes. The goal of this paper is to discuss one effective methodology which can be implemented to reduce marine waste by detection of plastic in the ocean. This can be called marine debris detection. The method here used is improvised YOLOv5 which is a fast and effective method to get the trained model of the objects we need to detect. It can efficiently detect the waste present in the ocean water which helps to eradicate the waste sooner at a faster pace. It is also possible to bring up more effective methods for the same cause to ensure the detection can happen more accurately. As compared to earlier models our work is able to depict the image of floating plastic on a water surface even if the object is transparent with a high accuracy rate. This helps in the reduction of plastic waste in the water.

Keywords. YOLOv5, marine debris, environmental degradation, plastic, industrial revolution, floating waste, ocean water, detection

1. INTRODUCTION

The industrial revolution has led to many changes in human lives. The main impact of the industrial revolution is the environmental crisis. When an environmental crisis occurs, it is very difficult to adapt to the current living situation and also move towards sustainable development. Sustainable development refers to the future world where the future human life needs to sustain with currently available resources. But the major problem is with the increase in population day by day how to move towards sustainable living. Not only population but there are many other concerns too, such as, change the earth's climate or even the rapid changing technology, these changes have a great impact on human health.

But technology has proved itself that it cannot only be a bane but also a boon to society. There are many technologies which have a bad effect on the environment such as smartphones or laptops which produce a lot of non-biodegradable waste. But if we look into the other side of the wall we find that we have many technologies to protect the environment such as monitoring pollution levels in air, water or soil, we have navigation,

automation, quantum computing to manage any sort of emergency crisis in the environment.

Marine debris is the major cause of water pollution. The main cause of marine debris is dumping and littering debris into marine areas. Another big cause is careless or improper disposal of waste. This waste causes severe injury and even leads to death of marine species. Debris is manmade which reaches the ocean in many ways. It is very natural that with increase in human population there is also a very rapid increase of waste. But where does all this waste be managed? Some of the waste could be buried underground which is called waste dumping. But with such a huge population all the waste cannot be buried into the soil. Most of our waste is settled under the sea bed causing huge pollution in oceans and other water bodies. These wastes are usually called marine debris. They can enter into the ocean knowingly or unknowingly by human means. Due to this, there is a huge risk for all the marine life under the ocean. The main purpose of this article is to share knowledge regarding how we can tackle this issue using marine debris detection method.

2. LITERATURE SURVEY

In this paper, to measure water quality various debris which is floating can be used as one type of visual index. The debris which is floating has a great impact on the quality of water and the evaluation of the environment. Some sources of garbage in water are domestic garbage, plastic bags, bottles, and many more. The images are captured, filtered, and analyzed, and then from that texture, color, shape, and other features are extracted. Implementation of real-time floating debris detection and to improve the ability of extraction FMA (feature map attention)-the YOLOv5 object detection algorithm is used. This method is more effective for automatic monitoring of debris that is floating which saves a lot of work. Further work mentioned in this paper is detecting blurred and dense objects by the semi-supervised learning method and increasing the robustness of the model [1]. In this paper, a Vision-based water surface garbage capture robot was developed to tackle water surface pollution. This method was more specific to improving detection scales and real-time detection performance in dynamic aquatic environments. By capturing robots there may be a reduction in labor volume of workers, applied to clean up water surface garbage and improve the water ecological environment. In this primary task for capture robots are detection of garbage, capturing and then collecting the garbage. For object detection, CNN is utilized, for detection of floating garbage a modified YOLOv3 algorithm is used, and finally by K-Means clustering water surface garbage is clustered [2]. The paper talks about classifying micro plastics and counting them automatically using a Computer Vision-based system. Due to plastics' durability, it is difficult to manage and is a serious issue nowadays, and handling million tons of plastic in the sea is the biggest current environmental problem. Computer Vision-based systems can automatically count and distinguish different microplastics into five different visual classes. Different characteristics of a few images are collected from samples and then followed by steps which include segmentation step based on Sauvola threshold method followed by feature extraction and classification step and this is evaluated by deep learning approach. By this method, the time taken is half when compared to segregating normally. Further work which the author mentioned was to apply this method for large datasets which is an expensive task [3]. In this paper, the author has specified the use of Raman Spectroscopy to detect microplastics underwater as plastics have become widely applicable in every

aspect of modern-day life. By Raman Spectroscopy they were able to extract the chemical structure of objects by collecting various spectral signatures. Raman Spectroscopy focuses on changes in the intensity of light. The first step in the methodology was pulverizing plastics and then collecting the plastic samples to retrieve spectral signatures and at last, using partial least squares discriminant analysis samples were classified. Further work mentioned in the paper was how a change in the environment can affect the performance of the method [4]. The biggest growth factor which is contributing to environmental pollution is plastic waste. Plastics are widely used all over the world and are indispensable. Based on characteristic fluorescent behavior plastics are detected and identified in this paper under tap water. Using fluorescent light highly sensitive plastic images were detected as it will be difficult to detect plastic with higher water depths. In this paper, they have detected plastic using a simple model by just using fluorescent light by which it emits photons, and these incident photons are slightly transmitted, absorbed, and reflected. When a photon is absorbed, some atomic conversions take place, and this fluorescent photon is reemitted. By these, plastics are identified and detected in the water. In this method, real plastic sample identification is limited to methods whose thickness of the plastic is unknown. Further work mentioned is the detection of micro plastics in water and then distinguishing the impurities into organic and inorganic components [5]. In this paper, the author used hyperspectral imaging-based proximal sensing technologies. In this, they differentiate the industrial and household plastic wastes which become a basic mandatory step in their successful application. Two-linear-spectrometer apparatus is used to get hyperspectral images to form that they are extracting using near-infrared reflectance spectra of polymers. This results in the identification of polymers being very rapid and reliable. This became sensor design and technology application as well as in the marine ecosystem it made a foundation for intensive radiative transfer modeling of plastics [6]. The author has enumerated different types of debris here. Bottom trawling, pole trawling, videography, and submersibles are 4 different methods used to investigate debris during oceanographic cruises from 1993 to 1998. Hydrodynamic Methodologies, as well as anthropic factors, took a very important part in the result which caused variable results. Per hectare there were 200 pieces of debris and also its concentration is huge in some areas. Here they used a videography method using a towed camera which failed. And also faced some problems like positioning, speed, and altitude as well as detecting small debris was difficult [7].

3. METHODOLOGY

According to many papers surveyed there were several methodologies related to this work. After a detailed study of this work, the methodology chosen for this work was the YOLOv5 algorithm which uses pyTorch framework to detect objects.

In section *A.* we discuss the dataset and its processing. Section *B.* discusses the steps included in the preparation of data like Annotations and aligns the dataset with respect to work. Section *C.* contains the details of the modeling of the YOLO algorithm and the importance of the version of the algorithm used. Section *D.* is the alternative methodology, its advantages, and disadvantages.

A. The dataset:

Plastic pollution in the marine environment is causing major concerns. The plastic bags and plastic bottle pictures were manually taken for the preparation of the dataset.

B. Preparation of dataset:

The dataset which is manually collected was labeled using the roboflow website and then a data augmentation method was used for the preparation of the dataset such that the dataset was increased by slightly modifying the existing pictures. The dataset included plastic bags and plastic bottles. The dataset was divided into train, test, and validation. The train/test split percentage was set as 70%, 20% and 10%. The total training images were used to train the model, validation was used to validate if the model is working and testing images were used to test if the images are getting detected.

C. Modeling:

YOLO stands for you only look once. This method which just looks once means that the propagation is only once through the neural network. Any algorithm contains its own backbone for the purpose of pre-training the classes for future prediction. The algorithm used to achieve our goal is the YOLOv5 model which has PyTorch architecture. It is one of the best choices among any other architecture which has reusability. It contains tensors and optimizers for the dimensionality of an object. Optimizers can be used to alter the weights and biases so that by editing the internal parameters we can reduce errors.

In this algorithm, the backbone is the bounding boxes which are very precise and accurate. This extracts the rich characteristics of our input image such as plastic which is a transparent object. Now let's look into the neck of the model. The neck of the YOLO v5 model is the identification of objects using the pre-trained model and configuration file. Pre-trained model is nothing but the trained model of real-world day-to-day objects. It can be cat or dog object detection. We also have feature pyramids that are used in object scaling. Object scaling is nothing but the identification of the same object in different shapes and sizes. This helps in the recognition of unseen data. When it comes to the head of the model this is the final destination that the model reaches. Here the parameters included will be anchor boxes, class probabilities, bounding boxes, and object detection scores. These parameters help in cost function or loss function to generate the loss.

The optimization function in the YOLO algorithm is of 2 types. One is SGD and the other is Adam. SGD is the default optimization function.

Adaptive Moment Estimation (Adam) – This type of optimization learning rates are calculated for each epoch. The learning rate of an object can be the features that the model learns during its training.

$$mt = \beta 1 mt-1 + (1 - \beta 1)gt \quad (1)$$

$$vt = \beta 2 vt-1 + (1 - \beta 2)g^2t \quad (2)$$

mt and vt are evaluations of mean and the uncenteredvariance of the gradients. β1 and β2 control the decay rates of variance of gradients. As mt and vt are initialized as vectors of 0's, we observe that they are biased to 0, especially during theinitial period, and when the decay rates are small. Here small in the sense β1 and β2 are close to one.

In YOLOv5 the activation functions used are leaky ReLU and sigmoid functions. An activation function is used to decide whether the neuron should be activated or not. Leaky ReLU comes under the middle layer or hidden layer. The final detection layer includes sigmoid activation.

The YOLOv5 model used here is an improvised model which detects transparent plastic debris in the ocean with much higher rates of accuracy as compared to the model in [1]. The model is trained by giving 200 epochs which gave satisfying results of accuracy of around 96%. By altering the optimizers the current model performs more efficiently as compared to the earlier versions of YOLO.

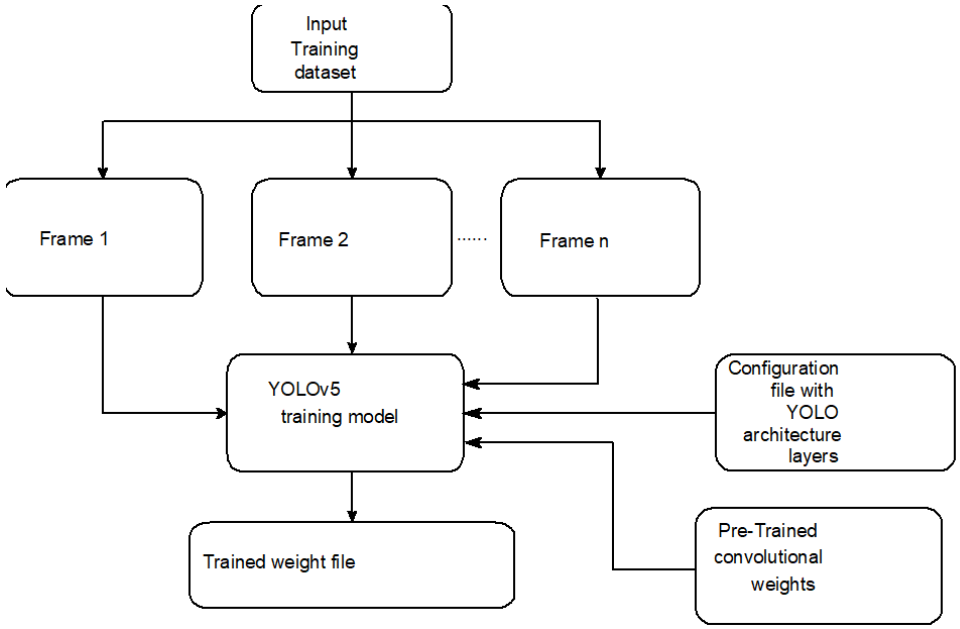

Fig- 1: Workflow Model

Fig-1 represents the workflow model of our research work.

D. Alternative methodology:

We can use other versions of the YOLO algorithm. The main positive side of this algorithm is it is updated every day and has the flexibility of different versions. This work can also use the YOLOv3 algorithm for the prediction of marine debris. The YOLOv3 algorithm uses darknet architecture for the prediction of concerns. Detection of small objects is quite difficult in version 3 of YOLO. Therefore version 5 outraces this.

4. EXPERIMENTAL RESULTS

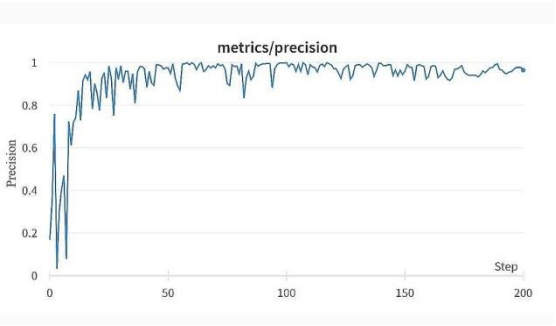

Fig-2: Precision Graph

Fig-2 tells about metrics precision. These curves are in a zig-zag format which goes up and down frequently. This represents the readability of the input image. The parameters true positive (TP), true negative (TN), false positive (FN), false negative (FN) are used to compare results of input images at each epoch. The x-axis represents the step which means a number of epochs. The y-axis represents precision which represents how accurately the object was recognized at every epoch.

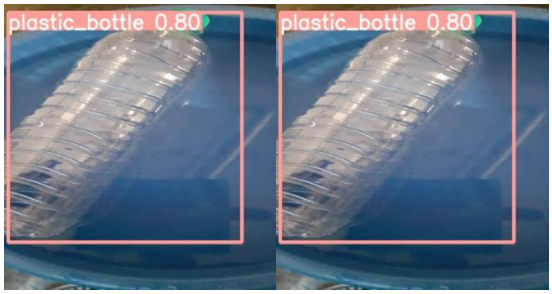

Fig- 3: Test Image Output

Fig.-3 represents the depiction of plastic bag and plastic bottle.

5. CONCLUSION

Finally, in this project, we conclude that we can use the YOLOv5 algorithm to solve the problem statement that is to detect plastic present in marines. This project will help us to approach sustainable development. The YOLOv5 algorithm uses pyTorch architecture which uses fewer weights and is more feasible. Hence, we can conclude to use this algorithm on this project to work efficiently. The result of the project is as expected. The model is detecting the required object but further micro plastics can be focused more as objects for detection.

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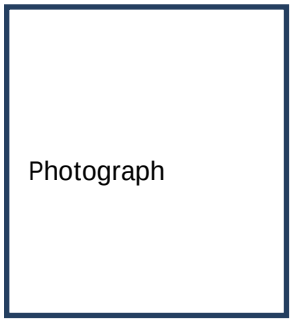


Author Name received the bachelor's degree in computer engineering from Cankaya University in 2010, the master's degree in computer engineering from Gazi University in 2014, and the philosophy of doctorate degree in Electrical-Electronics & Computer Engineering from Duzce University in 2017, respectively. He is currently working as an Assistant Professor at the Department of Computer Engineering, Faculty of Engineering, Duzce University. His research areas include mobile security, deep learning, and social network analysis. He has been serving as a reviewer for many highly-respected journals.

GeolocationAlert System For Drowsiness Detection

[1]Megha N, [2]Ranjitham M, [3]Rufina Mariam, [4]Jahnavi K, [5]Srinidhi N.N

Department Of Computer Science Engineering, REVA University, Bangalore.

Abstract.

India alone has had over three hundred thousand road accidents in 2020. Almost 30% of the road accidents have been proven to be fatal because of lack of aid. In order to fix this issue a location-based drowsiness detection system has been proposed. By leveraging points of interest on the face recognised by the camera and communicating to Convolutional Neural Network, the proposed system identifies drowsiness and sends in multiple alerts to not only alert the driver but also his emergency contacts. The given CNN-based model can be used to develop a highly accurate and user-friendly real-time driver sleepiness detection system for various hardware devices and smartphones.

Keywords. face detection, CNN algorithm, driver drowsiness, deep learning, artificial intelligence

1. INTRODUCTION

There has been a significant increase in the demand for modern forms of transportation over the years, which prompted a quicker consolidation of a report that states the vehicles that are popular in the area, called the car-parc data. A total of 63.8 million automobiles will be sold globally by 2020. This was a decrease from the previous year, as the industry saw a downward trend as the global economy slowed owing to the coronavirus outbreak that had swept across all countries. In the following year, global car sales increased to roughly 66.7 million vehicles in 2021, resulting in a rise in the graph.While the automotive industry has revolutionized the lives of people by making things notably easier, it also brought in adverse repercussions like traffic accidents.

India had 3,54,796 road accidents in 2020, with 1,33,201 people killed and 3,35,201 wounded. These numbers have been given out by the National Crime Records Bureau's research. In this study, fatigued driving was found to be responsible for around 20% to 30% of traffic accidents. Due to which, drowsy driving is a consequential and often overlooked danger in traffic incidents. Owing to the alarming rise in accidents by the year, a fatigue or drowsiness detection system made for drivers has been a topic of research and implementation but even though it's been a hot topic to research about, not many proposals cover a very important aspect of the drowsiness detection system, location based alerts.

While it is beneficial to alert the driver that he is not in his best frame of mind to drive, it is also incredibly useful and precautionary to send a location alert to the driver's emergency contact or employer so that if something untoward does happen, help can arrive immediately.

When it comes to detection methods, it can be categorized into two different types of methods such as - subjective methods and objective methods. A driver must take part in the subjective detection method's evaluation, which involves self-questioning, appraisal, and questionnaire completion and is connected to the driver's subjective opinions.The information is then used to foresee the quantity of vehicles which are being driven by drivers who are sleepy, permitting them to productively detail their courses more. The objective location strategy, then again, doesn't need drivers' input since it persistently analyzes the driver's physiological status and driving way of behaving. The data accumulated is used to decide if the driver is tired. Furthermore, objective detection may be classified into two categories: contact and non-contact. Because it does not require a sophisticated camera, non-contact is less expensive and more suitable than contact, allowing it to be utilised in a wider range of cars.

To address the inconsistencies and issues associated with road accidents caused by a person's weariness, we have developed a detecting system based on the CNN algorithm. This system has a 95% accuracy rate, making it a very good system for alerting the location when the driver is drowsy on the market. Furthermore, the system is low-cost to deploy, allowing it to be extensively adopted and reach a large number of drivers.

2. LITERATURE SURVEY

Sleep-related crashes account for a considerable fraction of all car collisions worldwide and due to this academics and automakers have devised a variety of remedies, ranging from identifying trends in driving behaviours to measuring the driver's brain waves and vitals while driving. The majority of these solutions are underpinned by statistical and machine learning-based prediction algorithms.The study takes into account current technologies as well as research on the project's topic. It's an attempt to have a better grasp of the research efforts that have gone into this subject, as well as to establish where we should focus our efforts when working on this project.

Multi-access edge computing is a low-latency approach (MEC). Instead of using a central cloud server, MEC technology provides processing and storage capabilities to the edge of the mobile network. MEC has been tested in a variety of mobile applications and has shown to be faster than cloud-based solutions. Over 5G networks, the implementation of MEC-based DDD systems will result in real-time judgements, ensuring the driver's safety[1].

Dua et al [2] identifies the driver's fatigue. The four models which are based on deep learning techniques make up this architecture are ResNet, AlexNet,VGG-FaceNetand FlowImageNet. Face expressions, head motions, hand gestures and behavioural traits such as head, eye, and lip movements are all extracted using these models.The VGG-FaceNet model identifies and extracts face features, whereas AlexNet model adjusts for various ambient and background variables. Head gestures and behavioural characteristics are

extracted using FlowImageNet, while hand gestures are extracted using ResNet. The models chosen by Dua create four outputs from the RGB film of the drivers, which are sent to an ensemble technique termed simple averaging, which is then followed by a SoftMax classifier. 's approach has an overall accuracy of 85, according to Dua et al.

Yassine uses the same "awake" and "drowsy" categories as our method, but excludes the "low-vigilant" videos. The authors employ roughly 100–120 photos per recording in this example. The fatigue detection model is a basic CNN that was built from the ground up and consists of five convolutional layers, a flatten layer, and a dense layer. Although the overall accuracy on the test photos is 69 percent, due to the high number of false positives (56 percent of the images examined), this model cannot be considered for a genuine implementation on an ADAS. It should be mentioned that, according to the author's code, the random train/test split of data (80% train/20% test) was conducted after the photos were extracted. As a result, accuracy might have been harmed if frames from the same movie were utilised in both the train and test sets. Because each video is shot under different settings, the network may be learning to distinguish the scenario depicted at a given frame (person, perspective, lighting) rather than the subject's exhaustion [3].

The feasibility of establishing a hybrid measurement-based detection system, such as vehicle-based, physiological, and behavioural signals was investigated by Gwak et al[4]. This inquiry involved a total of sixteen persons. From the calculated data and videos, a total of 80 features were retrieved. There were three components to the study.

At first, the drivers' physiological signs, driving execution, and social tiredness markers were recorded utilizing a driving test system and checking framework.After that, two distinct classification methods were used in order to classify: RF classifier and majority voting, employing logistic regression, SVM, and KNN. Backward feature selection was carried out consecutively in the case of a majority vote, followed by classification.Four approaches are utilised to categorise films into one of the three available categories in [5], the study where the UTA-RLDD was described. The HM-LTSM network, with 65.20 percent accuracy, achieves the highest global accuracy among these approaches, with global accuracies ranging from 57 to 65 percent. The accuracy on both awake and sleepy footage is impressive, hitting an impressive 80 percent in both. Despite the encouraging results, false alarms would be raised in 19% of the cases, therefore the system might be modified to lower this percentage. It's also fascinating to compare them to a human judgement baseline, in which four volunteers evaluated each video's sleepiness degree. The accuracy of human judgement was 57.8%. The rate of false positives is greater in 37 percent of situations, however, when employing human judgement, the system notifies the driver needlessly.

Sun [6] is the first to introduce DCNN based on CNN to recognise important human face points, due to the advancement of deep learning. Themodel detects five facial essential points, but it does it quickly. Zhou [8] used FACE++, which optimises DCNN and can detect 68 facial key points, to gain a greater accuracy for facial key point identification, however this approach contains too much of a model and the operation of this algorithm is quite hard.To enhance different layers of CNN, Wu [7] presented Tweaked Convolutional Neural Networks (TCNN), which is based on Gaussian Mixture Model (GMM). However, TCNN's robustness is too reliant on data. Deep Alignment Network (DAN) was put in place by Kowalski [9] to distinguish face important points, and it outperforms most algorithms.Large models and calculations based on complicated functions are required by

DAN. DriCare uses Dlib [9] to differentiate critical spots on the face in order to meet the real-time performance requirement.

A large number of academics are working to find a remedy to road accidents caused by drowsy drivers. The numerous study findings have been divided into several categories.

Zhang et al. (2020) developed a sleepiness detection system for drivers on the basis of Karolinska Sleepiness Scale (KSS) [10]. A Mixed Effect Ordered Logit (MOL) model is combined with a Time Cumulative Effect (TCE) model in the proposed approach (TCE). The MOL-TCE model was compared to non-MOL-TCE models in an experimental study, and the findings demonstrate that the recommended model is 62.84 percent more accurate compared to the present models. Anevaluative method to detect driver fatigue was created by McDonald et al. [11]. The approach, which was combined with the Dynamic Bayesian Network algorithm (DBN), gave way to a false-positive rate which is much lower than the previous PERCLOS method for identifying driver drowsiness.Wang et al. [12] compared the performance of classical machine learning and deep learning algorithms to picture categorization. The research was carried out on both large and small datasets, including the MNIST and COREL1000 datasets. The conclusions derived showcased that the traditional form of machine learning functions tremendously better on small datasets, whereas deep learning performs better on large datasets.Kumar et al. concentrated on the utilisation of embedded systems and signal processing technologies to create surveillance systems [13]. For improved vehicle control, the system focuses on three deciding factors: identifying driver tiredness, alcohol intake, and crash detection. The experimental findings suggest that this technology is more efficient and accurate than the present analogue system.

Moujahid et al. compared an efficientface descriptor for identifying driver sleepiness to the NTH Drowsy Driver Detection (NTHDDD) dataset. In terms of performance, the proposed framework has been proved to be as effective as a convolutional neural network.

Using the wavelet packet transform, Phanikrishna et al. [15] developed an automated classification system for identifying driver drowsiness.From the driver's single-channel Electro-Encephalogram (EEG) data, the wavelet packet transform was created. The suggested model performs the real-time sleep analysis with a precision of 94.45%. Li et al. [16] suggested a technique for detecting urban crimes by assessing facial expression and emotion correlations. The Facial Expression Recognition (FER) strategy was created and used to decide a user’s emotion in view of their look, and the outcomes were contrasted with the Kernel Density Estimation (KDE) way to deal with show a connection among mind-set and driving example.

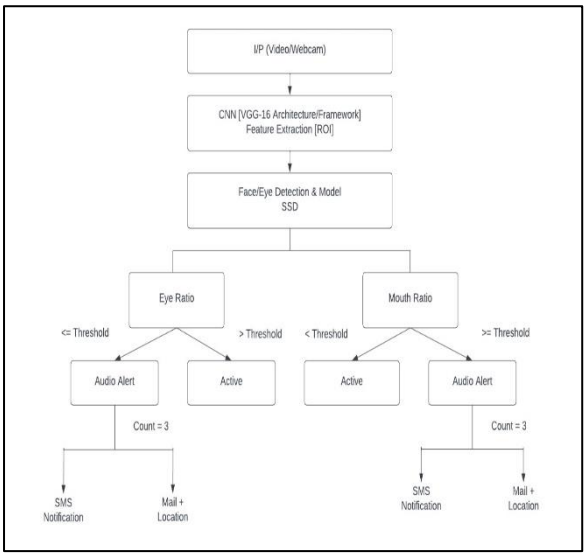
The project implemented is an effective way of extracting eye features and determining the drowsiness state of the driver.

3. METHODOLOGY

The system suggested is designed for automating the surveillance over any person who is on the road, driving. The entire project is done real time so that any sort of mishaps on the road can be controlled efficiently.

With the help of a webcam, images are captured and processed as the input. Our selected regions of interest are the eyes and the mouth. A CNN classifier processes those images and a eye-aspect ratio and the mouth aspect ratio is formulated. If the ratio is lesser than a specific threshold value for eyes then an audio alert is played. If the mouth aspect ratio is

greater than the threshold then the yawn counter increases. When the yawn count reaches a specific value, an audio alert is sent. If three audio alerts are sent to the driver then the driver's emergency contacts are notified via SMS and email. In conjunction to that the real time location of the driver is also sent. Fig 1 seamlessly depicts the workflow of the project.



An endless loop has been developed to access the camera, which catches every frame and stores the picture in a frame variable. This is done by the means of OpenCV.

SSD is intended for object recognition proof continuously, and finding regions of interest in the proposed project is used. R-CNN is quicker since it uses a locale proposition organization to develop limit boxes and afterward utilizes those containers to sort things. The whole interaction runs at a pace of 7 frames each second, which is viewed as forefront concerning accuracy. Undeniably not exactly is expected for constant handling. SSD speeds up the cycle by eliminating the requirement for the locale proposition organization. To make up for the deficiency of accuracy, SSD offers an assortment of developments, for example, multi-scale elements and default boxes. These upgrades permit SSD to match the exactness of the Faster R-CNN while utilizing lower-quality pictures, coming about in considerably quicker execution. It accomplishes ongoing handling speed and even surpasses the Faster R-CNN regarding exactness.

To empower discoveries of different scales, the SSD network utilizes highlight maps from many layers of a changed VGG16 system.

A CNN Classifier is used to assess if the driver is sleepy because the attention is mostly on the eye and the mouth. Convolutional Neural Networks are a type of deep neural network used inimage classification and computer vision. A primitive neural network is made up of three layers: a layer which is used for taking in input, a hidden layer, and a layer which

gives the output. Two or more hidden layers can be found in a deep neural network. Convolution layers are followed by a fully connected neural network in a convolutional neural network.

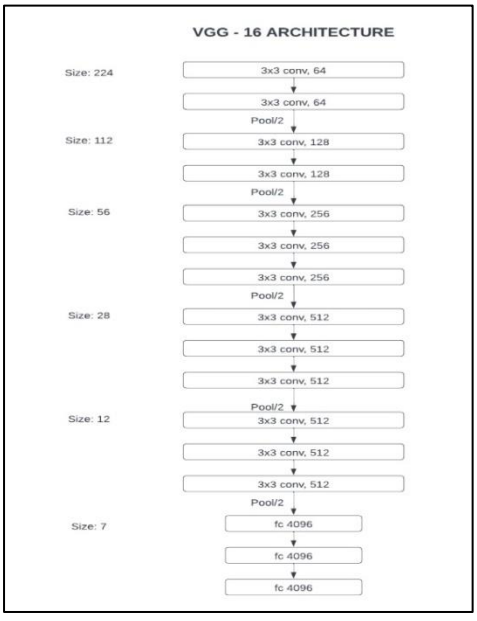
The image's characteristics are extracted via the convolution layers (input). A tiny filter or kernel analyses the picture, extracting features such as vertices and horizontal lines, and creating a feature map. Following the convolution layer, the pooling layer is the next layer. The feature map obtained by the convolution layer is effectively downsampled by the pooling layer.The precise site of the feature is included in a feature map produced by the convolution layer. This might lead to overfitting. A filter is applied to the features map by the pooling layer. It only uses the information relevant to that filter that is decided on the basis of the pooling technique selected, either the average of the values coming under the filter or the maximum.

This reduces the feature map's spatial dimension and turns the feature's precise spatial information to rough data.This reduces the risk of overfitting. Any convolution and pooling layer can be bracketed together on the grounds of the complexity of the input data set. After that, the last pooling layer is flattened and converted into a one-dimensional array, which is then passed on to the fully linked layers anticipating the output.

The convolution neural net (CNN) architecture applied in the proposed system is VGG16. As one amongst the most prominent vision models to exist, it is highly competent in completing the job. Rather of having a large number of hyper-parameters, VGG16 focused on 3x3 filter convolution layers with a stride 1 and always used the same padding and maxpool layer of a 2x2 filter stride 2. The convolution and max pool layers are placed in the same location throughout the design. It features two FC (completely connected layers) and a softmax for output in the end. The architectural flow is depicted in Figure 2.

The pre-calculated eye-aspect ratio should be less than threshold value and the mouth-aspect ratio must be more than threshold. If the former is violated then the driver is alerted by an audio file and if the latter is violated then the yawn counter steadily increases; when the yawn counter exceed a certain value, an alarm is played to the driver. However, if the score keeps increasing, the alarm is played thrice and an SMS is sent to the emergency contacts via an API.

Furthermore, the most important point is that this system sends the location of the driver as well using the geocoder module in python. The module allows to access the latitude and longitude of the driver, thereby giving the location via email.



4. EXPECTED RESULTS

The expected result accomplishes a number of things:
Accurate prediction

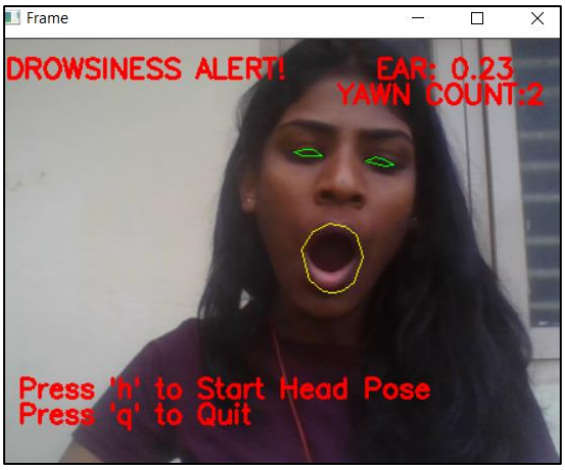


Fig 3

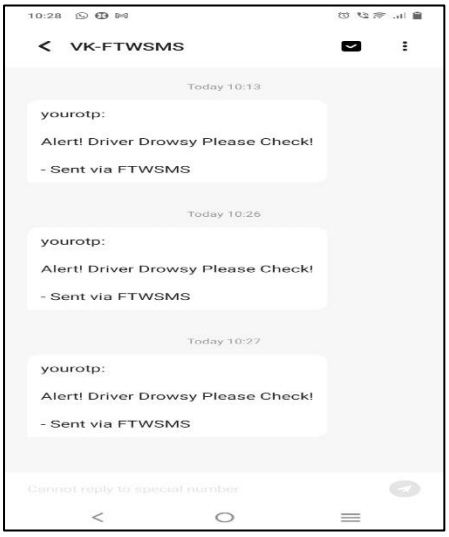


Fig 4

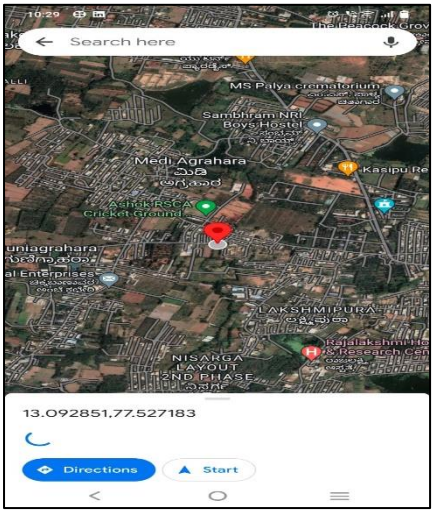


Fig 5

5. CONCLUSION

A CNN-based Deep Learning-based sleepiness detection system was described in the paper. The aim is to develop a lightweight system that could be employed in numerous devices and will most importantly alert the location of the driver as and when required. The proposed model was able to identify drowsy driving behaviour by recognising facial landmarks in collected photographs and feeding the information to a CNN-based trained Deep Learning model. The accomplishment was the development of a deep learning model that is relatively small in size yet extremely accurate. This technology might be readily integrated into next-generation car dashboards to provide increased driver-assistance systems, or even a hand-held device to intervene when drivers become drowsy.

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Cancerous Lung Nodule Detection Using Deep Learning

[1]Ranjitha U N, [2]Deeksha H Kottary, [3]Hasitha Chennubhotla, [4]Rachitha Padela, [5]Bhumika R

Authors affiliation, [1]ranjitha.un@reva.edu.in, [2]deekshahk20@gmail.com, [3]hasitha113@gmail.com, [4]rachithapadela4@gmail.com, [5]bhumikaraj04@gmail.com

Abstract.

A contagious lung tumor is caused by irresistible tissue development in the lungs, this is commonly called Lung Cancer and in biological terms called the Lung Carcinoma. We aim to use Deep Learning - CNN to identify cancerous lung nodules in the CT scan images. The LUNA16 dataset is the primary dataset we've used. A model that can identify the cancerous lung nodules and can distinguish the particular regions in the CT scan images will be our final product. We have used a part of the LUNA16 data set which is a smaller data set which has not been used previously. We are training our model with a smaller dataset because it is not possible for everyone to download a large dataset to train a model. Hence, when we are finding how efficiently a model works if trained with a smaller dataset. So, after training the model, from the experimental results we have achieved an accuracy of 96%.

For English language already ANPR system is available. For kannada language number plate we are proposing this model.

Keywords. Deep CNN, Lung Cancer Detection, Computer Tomography Scan, LUNA16 Dataset.

1. INTRODUCTION

One of the supreme causes of cancer-related deaths across the world is Lung cancer. In the year 2021, there were 130,180 confirmed deaths out of 236,740 fresh lung carcinoma cases. However, early recognition of malignant lung nodules is vital for a favorable prognosis and to reduce mortality percentage. In simple words, lung cancer is the unregulated division of unwanted cells in the lung nodules. Pulmonary nodules are tiny cell growths inside the lungs that can be cancerous (malignant) or noncancerous (benign). Malignant cells are cells that grow out of control, invading neighboring tissues and spreading to other regions of the body via the blood and lymph system. One of the leading causes of cancer in the lungs is smoking. Some of the symptoms of lung cancer are: Facing trouble while breathing, noticing blood when you cough, Pain in the chest, Weakness etc. Studies have shown that if cancer in the lungs is diagnosed in the initial stages, there are

higher chances of it being cured successfully and cancer prognosis is significantly improved. However, determining the possibility of malignancy in early malignant lung nodules is a challenging problem.

MRI, biopsies, or surgeries are not suitable for moving organs such as lungs since the lung is a fragile and delicate organ and intrusive techniques pose a high risk of infection and raise patients' anxiety. Furthermore, it is expensive and takes a lot of time to give us results. CT imaging is the best approach to examine the diseases in the lungs because it offers highly detailed images of a large variety of tissues. CT scan pictures are suitable for analyzing lung cancer because they have higher magnification and can identify calcification. nevertheless, only 68 per cent of lung cancer nodules are successfully diagnosed when only one radiologist analyses the CT scan personally. Moreover, a radiologist's workload increases dramatically while evaluating a CT scan personally, for the presence of a nodule since detection efficiency is affected by nodule characteristics such as size, position, form, structures, and density.

To deal with this problem, our initial step will be to segment CT scans after preprocessing. After masking the CT scan, the subsequent step is to develop a model on the Deep Convolutional Neural Network (DCNN) model to achieve extreme precision. Early studies using deep neural networks for applications in medical images successfully demonstrated improvements in segmentation tasks. A part of the LUNA16 dataset will be used as the input layer in this project. This particular small dataset has never been used for training and we are using this dataset to test how efficiently we can train the model with a smaller dataset. The LUNA16 dataset is a subdivision of the LIDC-IDRI dataset which comprises 1,186 lung nodules labelled in 888 CT images.

2. LITERATURES SURVEY

The paper uses the lung cancer images dataset from the data world and uses classification algorithms like SVM, Logistic Regression, Naive Bayes, and Decision Tree to analyses and implement lung cancer prediction. Radhika P.R and her team achieved an accuracy of 66.7 % on Logistic Regression, 87.87 % on Naive Bayes and 90% on a Decision tree. [1]

This research paper contains a model which is a combination of Convolutional neural networks and ML algorithms like XG Boost, Support Vector Classifier and Random Forest that finds cancer in the lungs using cytopathology images. Basra Jehangir and his team achieved an accuracy of 99.13%. [2]

This paper uses the LIDC-IRDI dataset and uses XGBoost and Random Forest algorithms. Siddharth Bhatia and his team achieved an overall accuracy of 84%. [3]

This paper used the NLST dataset and applied Deep Scanner, a Deep learning-based newly developed algorithm. This model can predict a patient’s cancer status with an accuracy of 78.2%. [4]

In this research, Deep CNN was utilized to detect malignant and noncancerous lung nodules using CT images from the LIDC-IDRI dataset for lung cancer categorization. Deep convolutional neural networks are one of the finest algorithms for lung cancer diagnosis, according to Amjad Khan and his team, who reached a 100% accuracy rate. [5]

This paper worked on their self-made dataset and applied the concepts of VGG16-T a Deep convolutional neural network. In this, they detect pathological lung cancer at an early

stage. Shenzhen Pang and his team achieved an overall accuracy of 84%. [6]

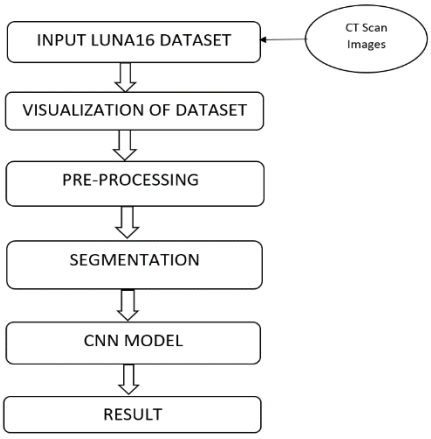
3. CHALLENGES

The dataset was problematic to download since the resources are hard to obtain and the hardware for processing the data is inadequate since the machinery for processing the data was insufficient due to the low quantity of storage available.

When the data is encoded to a 2D grayscale picture, it becomes difficult to train it with the TensorFlow and Keras frameworks since such forms are not supported during model development.

The dataset we used was in. mdh format, which is different from typical image processing formats like.jpg and so on. This layout stores all or most of the patient's information as well as a 3D CT-Scan image of the patient, however when converted to a 2D NumPy image results in the shape of (n, m, m, 1), which is not supported by transfer learning models.

4. METHODOLOGY



4.1. Dataset

We used a small part of the LUNA16 dataset which is the subset of the LIDC-IDRI dataset. It contains Dicom formatted CT scan of the lungs. It has annotated around 888 CT scans from 1186 lung nodule images.

4.2. Visualization

Visualization of the dataset is an important part of training, as it gives a better

understanding of the dataset. CT scan images are difficult to view on a standard computer or in any window browser. We utilize the Simple ITK library to solve this problem.
So here we firstly read the images and retrieve their voxel coordinates, resolution and their origins which is further used in finding the region of interest. Dicom images have patient information and doctor information in them. We use cv2 to resize the image dimensions to (224,224), which helps in further processing.

4.3. Pre-Processing: Segmentation

Pre- Processing any data in an ML model is a very crucial step. Pre-Processing of the image is done in order to enrich some features in the image and modify it to analyze and train it better. The CT scans are firstly split to training and testing dataset with a ratio of 80:20. Now these CT scans are segmented which is one of the Pre-Processing methods.
To find the region of interest in the lung CT scan image, we must perform segmentation on it which is an important step. Therefore, to make the feature extracting process more functional, segmentation of the Lung CT scan is done. To single out the lung region, connected component analysis can be used to segment out the largest air pocket in the lung. We normalize the CT scans for better homogeneity.
We are using the C3D based architecture with added adjustments to build the feature extractor, which will be used to predict the malignant lung nodules. The BRISK method is a feature point identification and description technique with scale and Preserving Parallelism-Rotations invariance. It generates the binary feature descriptor by constructing the feature descriptor of the local picture using the grey scale relationship of random point pairs in the local image's neighborhood. When compared to the old approach, BRISK's matching performance is quicker and its storage memory becomes less, but its robustness is decreased. Initially, we pre-train the model using the CT scan of some patients and then using the other CT scan images of other patients which was pre-processed we further train the model.

4.4. Model Implementation

We are using the Deep Learning Algorithm called the DCNN with Fully Connected Layers and Max Pooling. This is utilized for feature extraction and categorization of lung cancer cases that are positive or negative.
The feature extraction is done in many processes, each of which has three cascade layers namely the Convolutional Layer, Activation Layer, and Max-Pooling Layer.

1. Layer 1: Image is sent or fed to the network in this layer, and it is called the Input Layer.
2. Layer 2: The most significant aspect of DCNN is the convolutional layer. Its duty is to extract features from the data it receives. Convolution must be performed using a succession of kernels in these levels.
3. Layer 3: This layer adds nonlinearity to the algorithm, making it easier to understand complicated data and is called the Activation Layer.
4. Layer 4: The non-overlapping section of the original region is max-pooled by using a max filter and is called the Max-Pooling Layer.

We are also applying the Adam optimization. Adam is one of the best optimizers and can handle sparse gradients on noisy problems. We use it for the classification of the positive and negative cases of lung cancer. By applying this model, we have achieved an accuracy of 96%.

5. RESULTS

In this project, we used the Deep Convolutional Model 5 Neural Network. With this model, we got the following Accuracy, Validation Accuracy, Loss, Validation Loss.

The following is the Classification report we achieved:

	PRECISION	RECALL	F1-SCORE
0	0.99	0.96	0.98
1	0.84	0.98	0.90
ACCURACY			0.96
MACRO AVG	0.92	0.97	0.94
WEIGHTED AVG	0.97	0.96	0.96

Here '1' represents the positive cases and '0' the negative cases. Precision is the performance of the model in predicting true positives to false positives and true negatives to false negatives. Recall shows the performance of identifying true positives out of the total true positive cases and identifying true negatives out of the total true negative's cases. If we take the harmonic mean of precision and recall, we get the F-score.
We have used a part of the LUNA - 16 data set which is a smaller data set which has not been used previously. We are then checking for accuracy. After training the model, we have achieved precision on negative cases up to 99%, precision on positive cases up to 84% and total accuracy of 96%.

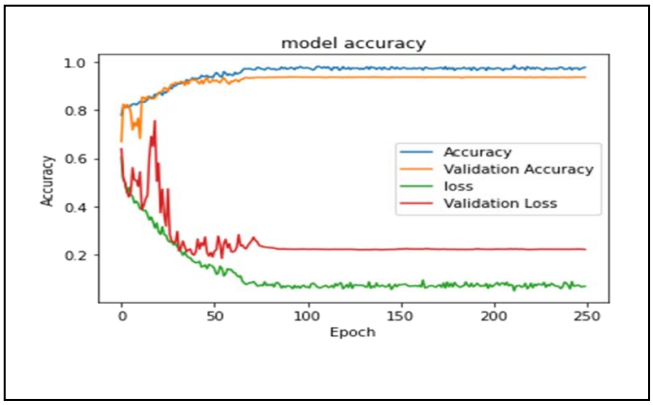
6. FUTURE WORK

In order to increase the accuracy, we can implement a combination of the Vgg-16 algorithm and Deep convolutional neural networks. This might increase the precision and the recall metrics as well as we are using a smaller dataset. Using a larger dataset would help in training the model better and make best use of the model. We would also like to work with different types of images and datasets and observe how the model behaves.

7. CONCLUSION

The project's ultimate goal was to test and improve the accuracy of lung nodule diagnosis while trained with a smaller dataset and prediction of positive cases using CT scan of the lungs. The promising results from the previous study encourage us to test the CNN-based lung cancer detection model on larger datasets. We wanted to see how well this model works on a smaller dataset. We have come to a conclusion that DCNN works better on larger datasets than on smaller datasets. Nevertheless, DCNN proves to be very accurate

and makes it easier for the radiologists to detect malignant nodules with utmost accuracy. We have implemented the DCNN Model which is giving us an accuracy of 96%.



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OCR AND TEXT RECOGNITION FOR ASSISTING VISUALLY IMPAIRED PEOPLE USING ANDROID SMARTPHONE

Venkat Biyyapu[1]
School of CSE
REVA University
Bengaluru, India
venkatbiyyapu1708@gmail.com

Y Venkateswara Reddy[2]
School of CSE
REVA University
Bengaluru, India
yattapuvenkatesh122@gmail.com

T Sai Kumar Reddy[3]
School of CSE
REVA University
Bengaluru, India
tsaikumarreddy5@gmail.com

K. Thanuja Asst. Prof [4]
School of CSE
REVA University
Bengaluru, India
k.tanuja@reva.edu.in

Abstract— **New technologies advancement of systems are providing assistance to visually impaired people. These systems aim to assist by supplying essential information about their surroundings to their users through the use of senses that they can still employ. In this project, we use Android Studios to create an app that uses existing technologies such as Text-to-Speech (TTS) and Optical Character Recognition (OCR) to identify and recognise texts from images captured by the Android phone's camera, assisting users in understanding what the image is about and also can be useful in navigation.**

Keywords— OCR, TTS, Android Studios.

I. INTRODUCTION

Braille has been used in most public areas for a long time, although it is mainly restricted to fixed signs and does not extend to temporary posting. If visually challenged persons need to read a text, they can scan it line by line with OCR technology and convert it to braille, or they may use TTS algorithms to read it. These gadgets, on the other hand, necessitate physical contact with the material being read, entails being aware that knowledge is there and having physical access to it. These two concerns are addressed by the suggested approach. The aim is to utilize a camera to automatically find information from several sources in the surroundings and tell the user of their position using TTS algorithms.

The system also reads the various sources using OCR and then uses Text-to-Speech algorithms to convey their information to the user. The system is built as a smartphone application in order to keep costs down.

Smartphones have various benefits over other devices, including the fact that they are not only inexpensive, but most models now include many cores in their primary CPU, making them quite powerful.

We begin by discussing the system design using an Android phone in this project. The text is then recognized from the picture, and the OCR engine is discussed. Finally, we go through the application's preliminary findings.

II. LITERATURE SURVEY

1. "OpenCV Based Implementation of Zhang-Suen Thinning Algorithm Using Java for Arabic Text Recognition" [2019]

   In this paper, they have used OpenCV library in order to perform text recognition, the algorithm they used in order to recognize is way complexed.

2. "Text recognition and face detection aid for visually impaired person using Raspberry PI" [2020]

This research presents a camera-based assistive text reading system to aid visually impaired individuals in reading text recorded on a captured image. Faces can also be identified by the mode control when a person enters the frame.

3. "Implementation of Text Recognition and Text Extraction on Formatted Bills using Deep Learning" [2020]

   In this paper, they employed the East method to convert letters and words from an image or scanned page into machine readable form, which is time consuming and also, they are just extracting the text.

4. "Machine Learning Tensor Flow Based Platform for Recognition of Hand Written Text" [2021]

   In this paper, recognition of text is based on artificial NN (Neural Networks), and they have determined the probability of getting the expected text.

5. "Offline Handwritten Quranic Text Recognition" [2020]

   The purpose of this work is to describe the offline handwritten Quranic text recognition system.

III. METHODOLOGY AND IMPLEMENTATION

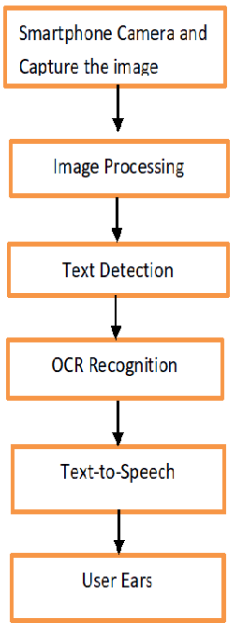

Fig1: Flow Chart of Proposed System.

In this project we have used Google Vision API which help us to achieve the OCR.

A. Optical Character Recognition (OCR)

OCR technology is a business solution for extracting data from written or printed text in an image file or scanned page and converting the text into a machine-readable format for data processing such as

searching and editing.

B. Text-To-Speech (TTS)

To produce a vocal version of the written document, the Text-to-Speech Engine technology (also known as TTS) is employed. TTS is gaining traction as the usage of digital devices grows, as is our reliance on speech recognition and other comparable technologies.

Above Fig1 flowchart, shows the design flow of app created. First of all, the app opens the camera and there would be surface area shown how much can the camera capture an image. Once the image comes under the surface area it gets captured.

The captured image will undergo image processing which would filter out the text. Then the detection of text happens with the google vision api which uses OCR software to perform the character recognition.

Once the character recognition is done the text is converted to speech by the Text-To-Speech Engine. The speech usually is converted to the locale language such as English or British.

After conversion the displayed on the app and also it read aloud so the visual impaired or any other user can hear it.

IV. RESULT

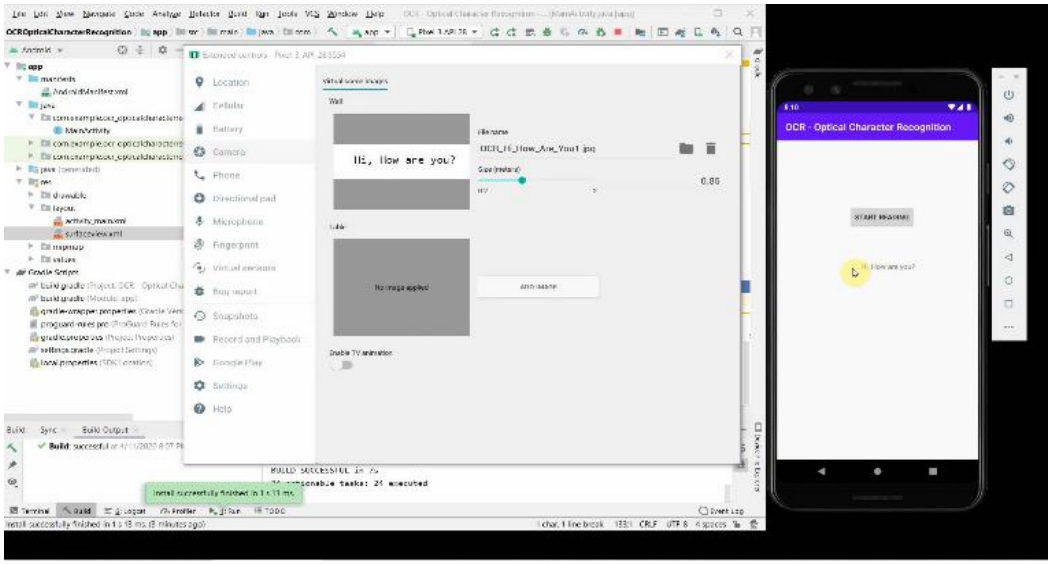

Fig 2: HI How Are You Message

The above fig shows the extraction of text form the printed image captured and it is read aloud correctly.

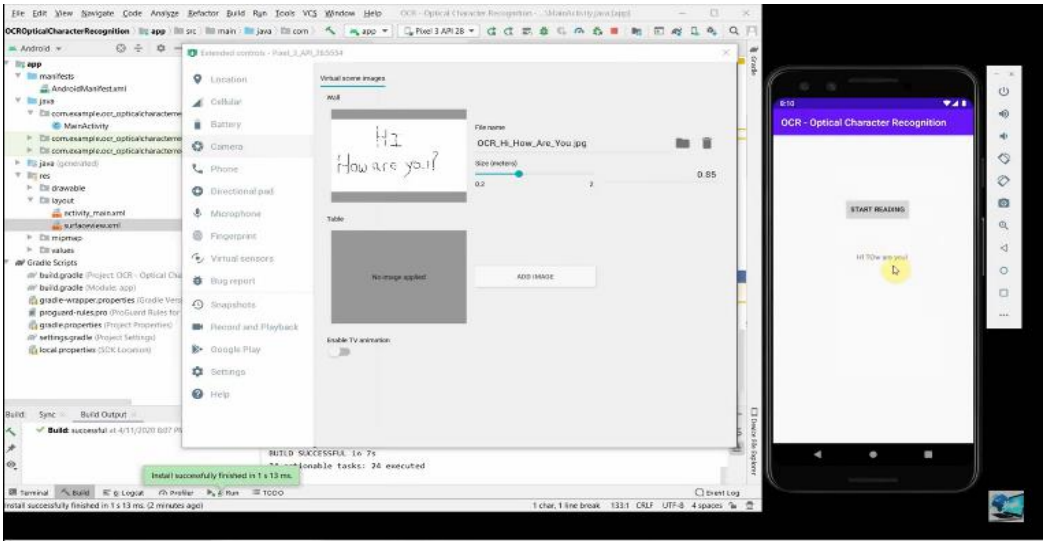

Fig 3: HI How Are You Message

The above fig shows the extraction of text from the handwritten image captured and it is read aloud.

We have installed an android emulator (Nokia 5G and Android above version 6.0), upon successful build the emulator starts running and after successful run it install the OCR App that we designed. Once OCR App is up and running, we have inputted printed image that. Once, the image comes under surface view, the text gets extracted. Extraction of the text is explained in the Methodology. After the extraction it is converted to speech and read aloud. Similarly, in case of handwritten the text is extracted and read aloud.

Figures from 2 to 3 shows the text detection and how it is read aloud. In case of printed image, the app could read it out loud accurately. But in case of handwritten image the app couldn't identify the text accurately. Instead "HI How are you" it detected "HI Tow are
you".

After trying with many images, we have found that the app developed was pretty useful in case of printed images
that had more clarity in extraction but it fails in case of handwritten images, as they don't have enough clarity of characters.

V. CONCLUSION

The design method for implementing a TTS algorithm that can help visually challenged persons to "read" the text in photos or documents was provided in our study. The trials indicate that the idea can be implemented on an Android smartphone using still photos, and that it can eventually be extended to a real-time version. But the drawback of the App developed is it fails to recognize the text and convert it to speech accurately in case of handwritten images. So, there is an enhancement going on to improve text recognition, by using Artificial Intelligence (AI) and Natural Language Programming (NLP).

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OpinionPoint - A Flask Based Web Application For Sentiment Analysis

Chirag Vijay
Student
School of CSE
REVA University
Bengaluru, India
R18CS101@cit.reva.edu.in

Clinton Jude Noronha
Student
School of CSE
REVA University
Bengaluru, India
R18CS260@cit.reva.edu.in

Devika Vijayan
Student
School of CSE
REVA University
Bengaluru, India
R18CS114@cit.reva.edu.in

Chatakondu Venkata Karthik
Student
School of CSE
REVA University
Bengaluru, India
R18CS092@cit.reva.edu.in

Vinay Kumar M
Student
School of CSE
REVA University
Bengaluru, India
vinaykumar.m@reva.edu.in

***Abstract*—In the present era, many people tend to voice their opinions via different platforms such as Facebook, Twitter, Reddit etc, and the data posted by these people (i.e. the users) is growing exponentially. This growth has attracted various clients relying on data on the web to gather information on various stuff (such as products, services, events and so on) in an attempt to forecast opinions and attitudes. This task of attempting to forecast opinions and attitudes by studying and analyzing people's opinions, emotions, sentiments, evaluations, and attitudes is known as opinion mining, or sentiment analysis [1]. In this paper, we explain the process in developing a web based sentiment analysis application with Flask (a micro web framework for Python) called "OpinionPoint" where opinions are gathered through tweets posted on Twitter. We have chosen Twitter because we can easily extract tweets with the help of Twitter API which is useful in generating a huge amount of sentiment data after processing. Twitter sentiment analysis allows one to keep track of what's being said about a certain product or service in real-time or over a specific period of time, and it also helps one detect angry/dissatisfied customers or negative mentions before they can escalate.**

Keywords— OpinionPoint, Sentiment Analysis, Opinion Mining, Python, Flask, Twitter

I. INTRODUCTION

Despite the long history of linguistics and natural language processing (NLP), according to the author in [1], not much research on people's thoughts or sentiments had taken place before the year 2000; however, since then, this discipline has become an active area of focus. Three explanations are given by the author for the sudden interest in this topic. For starters, it has various applications in numerous fields. Second, it presents a variety of difficult research questions that have never been investigated previously. The third area on which we concentrate is the vast amount of opinionated material available on the web through social media platforms. All this information was vital, and it would not have been possible to conduct study without it.

With the massive rise of social media on the internet, various services such as Twitter have developed as a plethora of data where individuals from all over the world express their opinions via tweets on a variety of topics. According to the data available, Twitter has approximately
396.5 million users, with approximately 206 million daily active users and approximately 500 million tweets being generated daily [2]. Through these tweets, one can easily extract huge amounts of data for analysis. We leverage this opinionated data available in the form of tweets and simplify the task of performing sentiment analysis through OpinionPoint, which is a web application built with Flask framework. It performs sentiment analysis based on a keyword inputted by the user and delivers clean, straightforward and neat results with supporting graphical visuals for clear understanding.

II. LITERATURE SURVEY

Doxa, an Ancient Greek Term which refers to an Opinion [3], is used to introduce the concept of sentiment analysis. On Lumen Learning website [4], in Chapter 6 under American Government section named as “Polling the public”, it is stated that During the 1824 United States Presidential election Harrisburg Pennsylvanian performed a “straw polling” in order to predict the results of the election, however the prediction was erroneous, presumably as a result of an improper sample. In 1997 the term semantic orientation was used by Hatzivassiloglou et al., in their paper which was based on predicting the results based on certain adjectives [5]. They took the corpus-based approach. It could explain that the terms 'bull' and 'bear' are contradictory in the reports of the stock market. The model achieved 90% precision using only adjectives.

Machine Learning was applied to sentiment analysis by Pang et al., in 2004. They suggested a detector based on the subjectivity which picks out various subjective sentences and the utilize various techniques to do the text categorization on those sentences. They achieved 86.4% accuracy. [6].

In 2005, Daniel et al., published their paper titled Predictive power of Online chatter [7]. They conducted a study to assess whether the comments which are present online have an impact on product’s sales figures or not. They have used Amazon sales data of books to compile this study and discovered that good comments led to greater sales of books.

In 2012, Onur Kucuktunc et al., published a paper which was based on Sentiment analysis of Yahoo! [8]. Within the context of an online question and answer site, they employed a sentiment extraction technique to study the influence of numerous parameters such as gender, age, education level, etc. They then discovered that the replies varied depending on the users attributes, for example, the answer which was best rated was having a neutral effect on the users. Eventually, their findings started being used in marketing and product recommendations.

In 2014, Cambridge Analytica gathered the personal information of around 87 million Facebook users, which was then used to create 30 million "psychographic" profiles of potential voters [9]. This data is believed to have been utilised to influence voter sentiment in favour of politicians who hired them.

III. MOTIVATION

The primary reason for conducting any type of Sentiment Analysis is to "know" and "understand." We concentrated onthe same thing, which was to understand or get to know the user. It is a natural curiosity to want to discover what the majority of people believe or which point of view is currently dominating the realm of opinions.

It is the desire to keep up with the constantly changing world of social media and to always be aware of what information is now trending and why it is popular. A piqued interest in learning what the general public thinks about a particular political party, football team, or film in order to gain a better knowledge of how trends flow.

Knowing how wonderful your products are or how popular your brand is can be significant in the case of business or industries, and knowing how customers react to new offers that are launched can be important as well.

IV. FLOW OF DATA

All the data used for analysis is in the form of the tweets that were being posted on the Twitter. When we use the Twitter API, it queries our request to the database, which is initially processed through Tweepy., which is a python module that allows developers to easily access the endpoints of the Twitter (Fig. 1). Tweepy takes care of various low-level aspects such as HTTP requests, rate restriction, authentication, etc on behalf of the users.

Without Tweepy, this task would be lengthy and quite erroneous. It allows one to emphasize more on the functionality rather than low-level details [10].

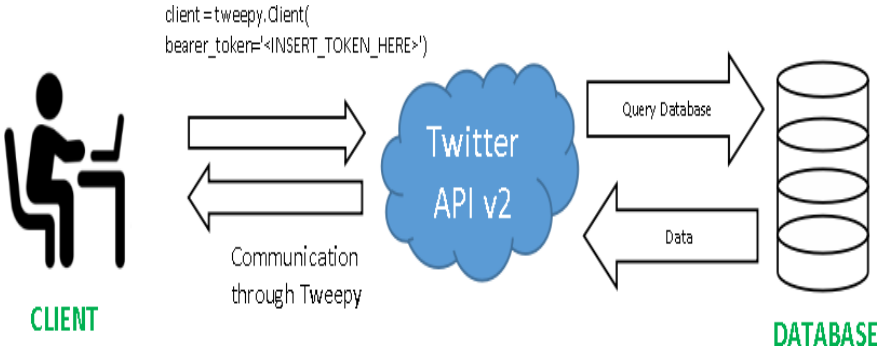

Fig. 1: Tweepy Python Library for easy communication with Twitter API v2

V. SOLUTION: OPINIONPOINT

After analyzing the current challenges faced, we propose our solution which is a Web Application based on Flask for Sentiment Analysis.

A. Features

- Free and easy-to-use web application for real timeanalysis of Twitter data to gather opinions.
- Generates a detailed report of the results afteranalysis is completed.
- Generates meaningful graphical representation ofthe detailed report.

B. Tools and Implementations

1) Visual Studio Code: All frontend (i.e. html, css, js) and backend code (i.e. python) was written on Visual Studio Code.
2) Flask: It is a micro-framework for web applications that is built on Python, built by Armin Ronacher. Flask is built with the Werkzeug WSGI toolkit and the Jinja2 template engine. The term "microframework" refers to Flask's goal of keeping the core basic but extensible [11].
3) Twitter API v2: Twitter API v2 is the most recent version of the Twitter API that all Twitter developers can utilise. Currently, it offers three levels of access (i.e. Essential, Elevated, Academic Research) and we have used the Essential level for this project [12].

Python Libraries Used:-

a) Tweepy: Tweepy is a Python library which is Open source that provides a very simple way for accessing the Twitter API. Twitter's models and API endpoints are represented by a set of classes and methods. Also it includes various details such as: HTTP request data encoding and decoding, pagination of results, Authentication using OAuth, Rate Caps.

b) TextBlob: TextBlob is a Python based text processing based library. It provides an API for analyzing into various (NLP) activities including noun phrase extraction, sentiment analysis, etc. [13].

c) Matplotlib: Matplotlib, a Python package which is used to create different types of visualizations. It is built on NumPy arrays and can be used with SciPy. One of the most significant benefits of visualization is that it provides visual access to massive amounts of data in consumable formats.

C. Working

a) Front-end

Our web based application has been developed on Flask which is a lightweight python micro framework.

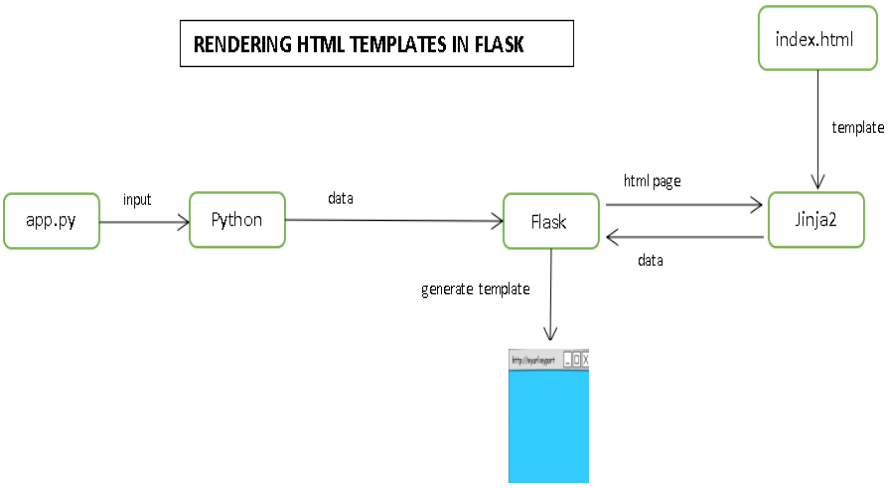

Fig. 2: Rendering of HTML Templates in Flask

Flask configures Jinja2 template engine for rendering HTML files (Fig. 2). Our application consists of three HTML files: the home page (Fig. 3), the sentiment analysis report page (Fig. 4) and the graphical visualization page (Fig. 5).

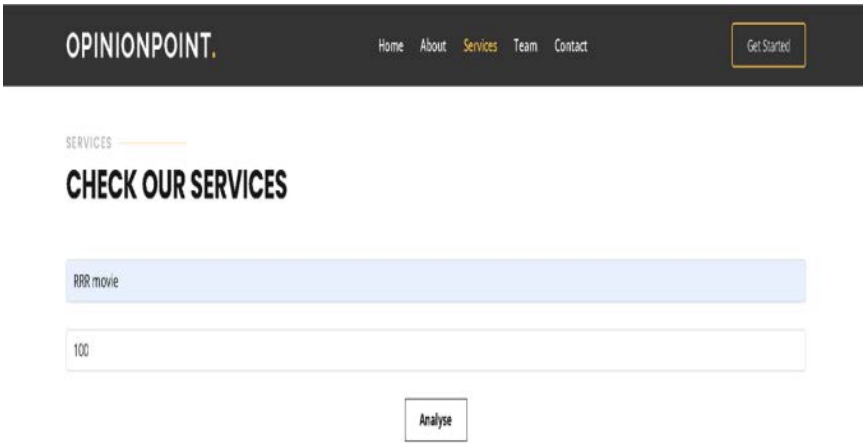

Fig. 3: Home Page

Fig. 4: Sentiment Analysis Report Page

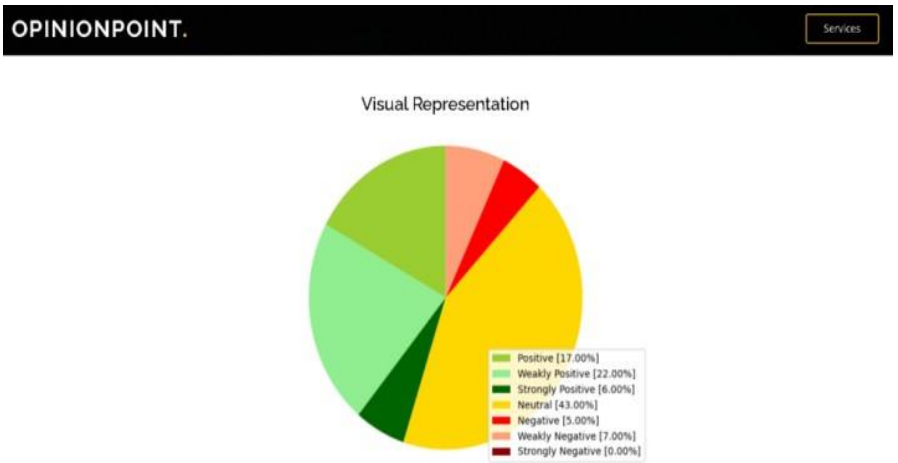

Fig. 5: Graphical Visualization Page

b) Back-end

In the figure below (Fig. 6), we can see the basic implementation of any sentiment analysis procedure.

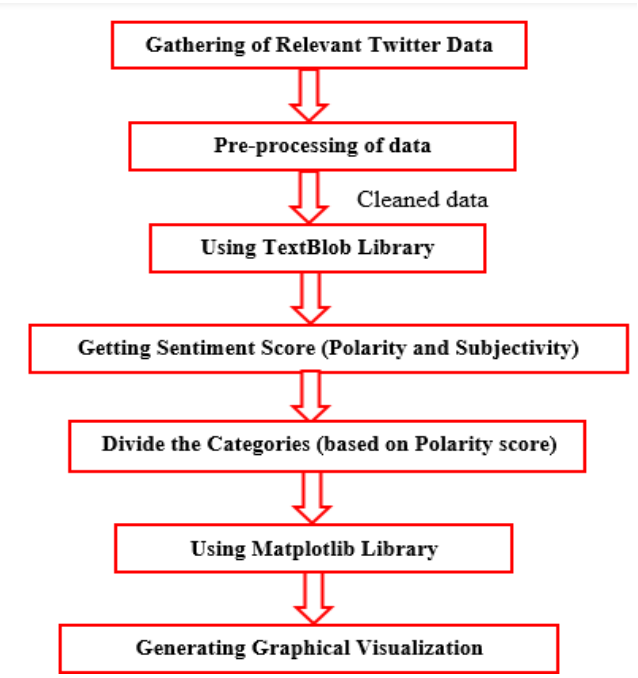

Fig. 6: Procedure to perform sentiment analysis

We will now go through each of the steps mentioned in the above figure (Fig. 6). The first step begins with collection of relevant data from twitter. This is done by querying the keyword inputted by the user through tweepy which in-turn communicates with Twitter API v2 (Fig. 1). Twitter API fetches for us the tweets related to the keyword and the fetched tweets are then stored in an excel sheet.

The next step involves the pre-processing performed on the tweets gathered. In this step, all of the tweets gathered need to be cleaned. Since the tweets are not always clean, the result could be affected (i.e. the accuracy of the results are proportional to how accurate the data is). The 5 main cleaning challenges that faced are :

1. Emotes are often used in tweets. However, when you pull the tweets, they are turned into unicodes. As a result, we eliminate them since we examine the sentiment of words rather than emotes.
2. Mentions, such as "@mention," aren't required to evaluate the tweet. Well, not all remarks can have an effect; only some usernames that give sentiments can have an effect on the outcome.
3. Hashtags can convey meaning in some circumstances, such as when a person posts a tweet with "#Happy," indicating that the user is pleased with the tweet he or she wrote. As a result, we remove only the hash, i.e., "#," while keeping the word as it is.
4. Remove stopwords such as is, to, as, the, and so on that are unnecessary because they do not convey any mood.
5. Tokenising the words will help us to make the tweet easy to extract the sentiment from it. We use a module named "tokenize" from the "nltk" library which tokenizes the words in the sentence. For example, the word "Crazyyyy" will become "Crazy" which gives a proper sentiment.

After the pre-processing of the data, in the next step all the cleaned tweets are inputted to a python library called Textblob. By using this library we can find the subjectivity and polarity of a tweet, these are the main factors which decide the sentiment of the tweet. The polarity and subjectivity is being calculated by the Textblob's sentiment function. Polarity is a number whose data type is float and range is from [-1, 1] where a positive result indicates 1 and a negative result indicates -1. Subjectivity refers to the degree in which the facts and opinion are present in the text. If the subjectivity is higher, it means that the text contains opinion rather than the facts. It is also a float which lies in the range of [0, 1]. The textblob.sentiments module contains two sentiment analysis implementations, PatternAnalyzer and NaiveBayesAnalyzer. For our project, we have used PatternAnalyzer.

Next we find the polarity score of each and every tweet and then categorize each tweet into different categories such as strongly positive, weakly positive, strongly negative, neutral and so on. The categorization is based on the polarity score. In Fig. 4, we can see this categorization in the detailed report page.

Finally, to represent this result visually, we use Matplotlib library as this library can help to visualize easily with clean and simple graphs and charts as seen in Fig. 5.

VI. LIMITATIONS

1. Given that the tweets will represent our views on the topic, there is a potential that the tweets' emotion will be distorted. For instance, sarcasm is a significant root cause. Algorithms aren't perfect at figuring out when people are being honest about their feelings or not. Which is why it's so difficult to comprehend what people are saying, even when they're telling the truth.
2. There are three versions of the Twitter API and three different API access levels; we are currently

using version Twitter API v2 and the essential level, which imposes constraints on how we utilize the API. Among the restrictions that influence our project are the following:

- The number of tweets that we can collect is restricted to 100.
- Because the twitter api only returns tweets that were recently posted, there is no way to retrieve tweets from several timelines (Since there is noaccess to advanced filter operators).
- Each month, we can retrieve a maximum of 500k Tweets.

The restriction issue can be resolved by applying for the third level of Twitter API v2 access i.e. “Academic Research” on the developer account.

VII. CONCLUSION

Presently, sentiment analysis has become a critical component of various huge enterprises and organisations and its use for data mining or obtaining competitive intelligence will only increase in the future.

"OpinionPoint" is a project that analyses millions of tweets and visually represents what people believe. To accomplish our goal of establishing a sophisticated website for our visitors, we incorporated a variety of technologies, including the Twitter API, the Python library "Textblob," Flask, and Bootstrap. OpinionPoint's user interface is straightforward and clear, and our users receive neat results. Our users may be non-programmers, business owners, industrialists, or anybody else interested in staying current with trends.

- The website can be used to determine whether or not a product or service is popular.
- It can also be used to determine whether a policy ispopular or well-accepted in society.
- Additionally, to get a sense of how people feel about any generic idea or issue.
- The best feature of the initiative is that everything is real-time; every opinion you receive is immediate.

As we live in a world where technology are constantly developing, we will continue to work on discovering better APIs and algorithms to optimize our project for the benefit of our users.

ACKNOWLEDGMENT

The success of the completion of this project is an effort ofstrategic teamwork and a few people who were very helpful to us in this project. We would like to express our profound gratitude to our mentor, Prof. Vinay Kumar M, for his assistance and valuable inputs during the process of developing our project and conducting our research. Additionally, we would also like to express our sincere gratitude to our institution REVA University for providing us with this incredible opportunity and unwavering assistance in completing our project.

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Application Of Machine Learning in Recommendation System: A Movie Recommender

Rehmanali Dauva[1],K Amuthabala[2], Sahil Raja Mohammed[3], Sagar Kumar Rajput[4], Salahuddin Khan[5]

[1,3,4,5]Students,School of CSE, REVA UNIVERSITY

[2]Assosicate Professor,School of CSE,REVA UNIVERSITY

Abstract.

The use of internet has brought vast numbers of users online through different platforms. Unlike old days internet is not just limited to email surfing, there's so much in the internet or let's say everything is on internet. In modern world it feels like not just internet but the whole world is revolving around the content. Different kind of users have different taste, and they demand different kind of content. This scenario has made in rise of video sharing platform like YouTube and various OTT platforms like Netflix or Amazon prime videos and many more. When the internet is revolving around content, one of the major contents are movies. Recommendation systems in such cases are used to recommend user movies based on various factors like genre, rating etc. Recommendation systems use various algorithms to suggest best suitable movie based in various factors. We have implemented final datasets following algorithms: a. Singular Value Decomposition (SVD) b. K-Nearest Neighbor (KNN) Algorithm. KNN outperforms SVD in terms of Mean Absolute Error (MAE) and Root Mean Square Error(RMSE). The recommended movie in KNN is more precise than SVD and in each value of K in cross-validation, it is clearly seen that KNN is much better. Hence, KNN is a better model in movie recommendation than SVD.

Keywords. K-mean Algorithm, SVD, RSs- Recommendation Systems.

1. INTRODUCTION

A Recommendation System or simply a recommender would be a model or system where user would get suggestions for various thing in real life, it could be while shopping online or watching videos online. Recommender Systems (RSs) assist individuals in discovering new or recommended things. It helps consumers find new items and services, such as movies, videos, podcasts, series and sometimes even people, example Facebook Suggests friends in You May Know list. These mechanisms are also important in making decisions, assisting humans in getting optimum results or lowering the negative impacts or hazards. Many information-based organizations, like Google, Twitter, LinkedIn, and Netflix now use RSs to better serve their user base. The field of RSs is thought to have started almost in the 1990s when team of researchers and developed launched first RSs known as Tapestry. Scholars & Researchers have been studying the application of Machine Learning (ML) algorithms which is subset or an artificial intelligence field, as the RS field has been evolving (AI). The study or research of Machine Learning was started in late 1950s when

the domain of AI-first started growing. Presently, there are huge number of ML algorithms (Such as SVD, k-nearest neighbor or Bayes network are few of them) which can or are used in applications ranging from small application like vacuum cleaner robots to complex life problems like providing help for differently-abled people or maybe in pattern identifying in images and self-driving cars etc.

ML algorithms provides personalized recommendations in various domains especially for Recommendation systems, as previously stated. However, due to the large number of techniques and tweaks presented in the literature, the ML field needs a comprehensive classification approach for its algorithms. As a result, when developing a RS, choosing an ML approach that meets one's needs becomes difficult and perplexing.

An approach for assisting practitioners and researchers in deciding the Machine Learning algorithm to use in a system for recommendation and discovering the areas that may be progressed in the development of RSs is to examine the RS and ML areas. Implementing the ML algorithms can help highlight patterns of growth and paves the way for further researches. As a result of this systematic study, researchers and practitioners should be able to understand more about the Recommendation application area and make well-informed research and implementation decisions.

A. Existing System

Over the past couple of decades, many recommendation systems are proposed that use various filtering methods. Different Big Data and Machine learning approaches are taken into consideration while developing the systems. Researchers and Scholars previously developed a collaborative filtering-based recommender system that leverages user ratings to offer suggestions.

B. Problem Definition

- To identify false Rating
- To identify Ranking Prediction

C. Objectives

- To identify best ML algorithm suitable for RSs
- To recommend the user movies based on rating and other factors
- To eliminate false rating

2. METHODOLOGY

A. System Design and Architecture:

People who enjoy viewing movies will benefit from the system. Different people have different tastes in movies. The figure below shows the system diagram of the movie recommendation system.

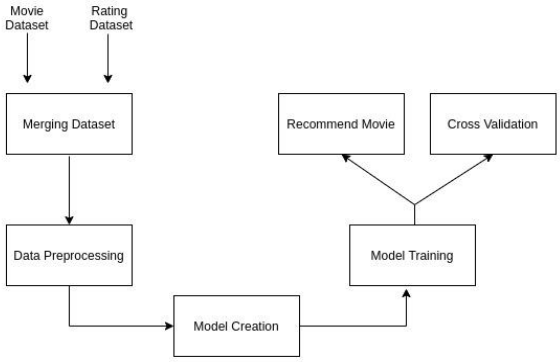

Figure-1:System Archiecture

A. *Data Collection* :

We gathered information from numerous movie rating websites like IMDB, MovieLens etc. Finally, collected data are in CSV format.

	movieId	title	genres
0	1	Toy Story (1995)	Adventure|Animation|Children|Comedy|Fantasy
1	2	Jumanji (1995)	Adventure|Children|Fantasy
2	3	Grumpier Old Men (1995)	Comedy|Romance
3	4	Waiting to Exhale (1995)	Comedy|Drama|Romance
4	5	Father of the Bride Part II (1995)	Comedy

Figure-2:Movie Dataset

	userId	movieId	rating	timestamp
0	1	1	4.0	964982703
1	1	3	4.0	964981247
2	1	6	4.0	964982224
3	1	47	5.0	964983815
4	1	50	5.0	964982931

Figure-3:Rating Dataset

userId	1	2	3	4	5	6	7	8	9	10	...	601	602	603	604	605	606	607	608	609	610
movieId																					
1	4.0	NaN	NaN	NaN	4.0	NaN	4.5	NaN	NaN	NaN	...	4.0	NaN	4.0	3.0	4.0	2.5	4.0	2.5	3.0	5.0
2	NaN	NaN	NaN	NaN	NaN	4.0	NaN	4.0	NaN	NaN	...	NaN	4.0	NaN	5.0	3.5	NaN	NaN	2.0	NaN	NaN
3	4.0	NaN	NaN	NaN	NaN	5.0	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	2.0	NaN	NaN
4	NaN	NaN	NaN	NaN	NaN	3.0	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
5	NaN	NaN	NaN	NaN	NaN	5.0	NaN	NaN	NaN	NaN	...	NaN	NaN	NaN	3.0	NaN	NaN	NaN	NaN	NaN	NaN

Figure 4: Combined Dataset

3. DATA PREPROCESSING

After the data is collected, it must be examined to make sure that it is in the correct format. Only mandatory fields should be chosen. To clean the files, MySQL is used. Some manual work has been done with Excel. The Following Processes are used for data pre-processing:

A. Imputing NaN with 0:

userId	1	2	3	4	5	6	7	8	9	10	...	601	602	603	604	605	606	607	608	609	610
movieId																					
1	4.0	0.0	0.0	0.0	4.0	0.0	4.5	0.0	0.0	0.0	...	4.0	0.0	4.0	3.0	4.0	2.5	4.0	2.5	3.0	5.0
2	0.0	0.0	0.0	0.0	0.0	4.0	0.0	4.0	0.0	0.0	...	0.0	4.0	0.0	5.0	3.5	0.0	0.0	2.0	0.0	0.0
3	4.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure-5: 0 imputed Dataset

B. Removing Noise from the data:

In the actual world, ratings are sparse, hence very famous movies are used to acquire the points for data and movie passionate people are considered .No one would prefer to watch a movie with only a few ratings because are considered unreliable. The consideration of individuals on the other hand is solely based on the number of movies one has rated. Considering all of the above and doing some error testing and trial testing, we'll use various filters to reduce the noise inside the final dataset.

- A minimum of ten users must vote for a film to be eligible.
- To be eligible, a user should have voted on at least 50 films.

Visualize how these filters look like:

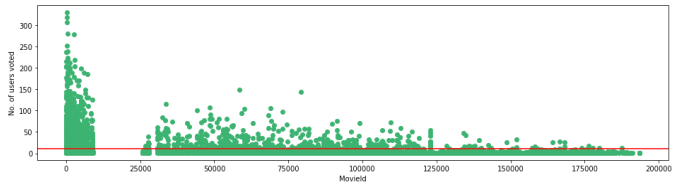

Figure-6: Representation of the number of visitors who voted using our 10-point criteria.

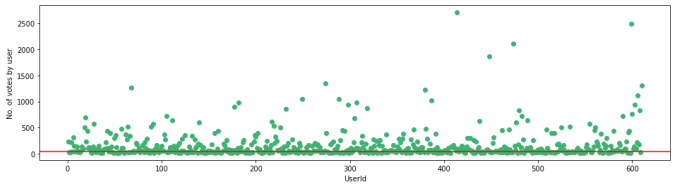

Figure-7: Representation of each user's voting results based on our 50-vote threshold

C. Removing Sparsity:

The enormous number of redundant zeros contained in the matrix structure makes sparse matrices computationally expensive. The difficulty of a huge scale greatly increases the complexity of space, making it difficult to solve these issues.

```
(0, 2)        3
(1, 0)        4
(1, 4)        2
(2, 4)        1
```

Figure-8: CSR Sample

Sparse values cannot be seen in the above CSR samples. Row and column indexes are assigned to the values. The number 3 occurs in the 0th row and 2nd column.

D. Model Creation:

We have implemented a movie dataset on two machine learning algorithms one of them is K-Nearest Neighbor (KNN) and other Singular Value Decomposition (SVD).

1) **Singular Value Decomposition:** A matrix's SVD is a factorization of that matrix into three vectors in mathematical concepts. It has several fascinating algebraic characteristics and offers crucial geometrical and theoretical insights regarding linear transformations.

```
U, S, V = randomized_svd(csr_data,
                         n_components=15,
                         n_iter=5,
                         random_state=42)
```

Figure-9:SVD

2) **K- Nearest Neighbour (KNN):** The full form of KNN stands for "K-Nearest Neighbour ". The approach could be used to solve both kind of problem i.e. classification as well as regression. The number of nearest neighbours to a new unknown variable that must be predicted or categorised is represented by the sign 'K' sign. It's a data classification approach that evaluates the likelihood of a data point belonging to one of group based on which measured values are adjacent to it.

```
knn = NearestNeighbors(metric='cosine', algorithm='brute', n_neighbors=20, n_jobs=-1)
knn.fit(csr_data)
```

```
NearestNeighbors(algorithm='brute', metric='cosine', n_jobs=-1, n_neighbors=20)
```

Figure-10:KNN

E. Model Training and Evaluation:

For Model Training, we have used CPU for the KNN algorithm and Colab GPU for the SVD algorithm.

1) **Single Value Decomposition:** We have trained and evaluated SVD models. For evaluation, we have used the same movie for recommendation and cross-validation approaches.
   a. **Movie Recommendation:** SVD was unable to recommend the movie accurately. Besides using different parameters tuning SVD fails to provide accurate results.

```
Recommendations for ['GoldenEye (1995)']:

GoldenEye (1995)
It Takes Two (1995)
White Balloon, The (Badkonake sefid) (1995)
Drop Zone (1994)
Hunted, The (1995)
Once Were Warriors (1994)
Hoop Dreams (1994)
Pie in the Sky (1996)
Unzipped (1995)
Walk in the Clouds, A (1995)
```

Figure-11: SVD Movie Result

   b. **Cross Validation:** Cross-validation, also referred as out-of-sample test or also called as rotation estimation, is a model validation methodology for examining how well statistical analysis results will generalize to a new data set. On subsequent iterations, cross-

validation is a resampling methodology that checks and trains a model using diverse chunks of data. While evaluating the results using SVD we have used 5 iterations. The Following values of MAE (Mean Absolute Error) and Root Mean Square Error (RMSE) e obtained.

Table-1:RMSE and MAE for SVD

Test	0.87	0.873	0.878	0.875	0.870
Test MAE	0.66 9364 43	0.672 15072	0.676 03402	0.671 06658	0.671 31548

2) **K-means Neighbor (KNN):** We have trained and evaluated KNN models. For evaluation, we have used the same movie for recommendation and cross-validation approaches.

a. **Movie Recommendation:** KNN was able to recommend the movie accurately. We have trained using different parameter tuning and accurate results were obtained.

	Title	Distance
1	Jurassic Park (1993)	0.412374
2	Stargate (1994)	0.409341
3	Batman (1989)	0.406579
4	Batman Forever (1995)	0.405572
5	Terminator 2: Judgment Day (1991)	0.404621
6	Mission: Impossible (1996)	0.397863
7	Speed (1994)	0.397093
8	Clear and Present Danger (1994)	0.390702
9	True Lies (1994)	0.387416
10	Die Hard: With a Vengeance (1995)	0.363683

Figure-12: KNN Movie Result

b. **Cross Validation:** We utilized five iterations to evaluate the findings using KNN. The following values of MAE (Mean Absolute Error) and RMS (Root Mean Square Error) are obtained (RMSE).

Table-2:RMSE and MAE for KNN

Test	0.9390	0.942	0.939	0.930	0.942
Test MAE	0.7176 5578	0.717 6315	0.720 06309	0.711 21797	0.720 1747

c. Content Based Filtering:

The underlying premise is that if you enjoy something, you'll like something "alike." It usually works effectively when determining the context/properties of each object is simple. The data user provides is used by a content-based recommender, such as explicit movie ratings from the MovieLens collection. Based on the data obtained, a user profile is developed, which ultimately gets used to provide suggestions to the user.The more the number of inputs obtained the accuracy of the machine gradually increases and can recommend far more accurately.

1050	Aladdin and the King of Thieves (1996)
2072	American Tail, An (1986)
2073	American Tail: Fievel Goes West, An (1991)
2285	Rugrats Movie, The (1998)
2286	Bug's Life, A (1998)
3045	Toy Story 2 (1999)
3542	Saludos Amigos (1943)
3682	Chicken Run (2000)
3685	Adventures of Rocky and Bullwinkle, The (2000)
236	Goofy Movie, A (1995)
12	Balto (1995)
241	Gumby: The Movie (1995)
310	Swan Princess, The (1994)
592	Pinocchio (1940)
612	Aristocats, The (1970)
700	Oliver & Company (1988)
876	Land Before Time III: The Time of the Great Gi...
1010	Winnie the Pooh and the Blustery Day (1968)
1012	Sword in the Stone, The (1963)
1020	Fox and the Hound, The (1981)

Figure-13: Filtered Movies

F. Comparison between SVD and KNN:

We have plotted the comparison multi-bar chart of both KNN and SVD algorithms and the result was compared between RMSE and MAE values.

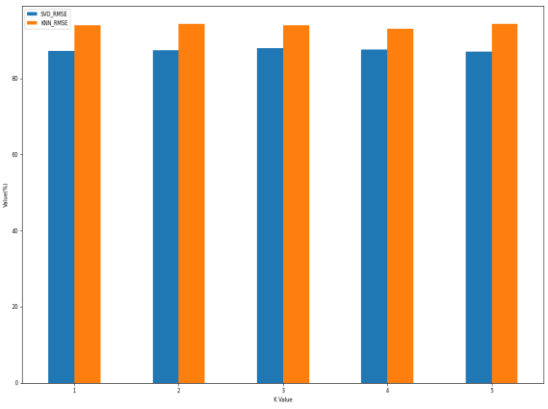

Figure-14 : Comparison between KNN and SVD of RMSE metric.

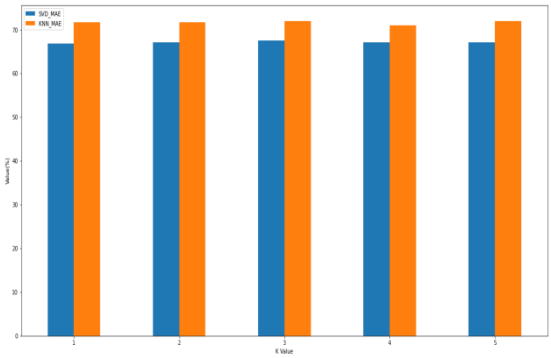

Figure-15: Comparison between KNN and SVD using MAE metric.

4. RESULTS

The Movie Recommender ML app proposes or suggests a movie to the user that is devoid of false ratings and has a very user-friendly interface. Out of KNN and SVD, KNN also proves to be the best algorithm to employ. The predictions were compared, and KNN was found to be the superior algorithm that is employed in the app and can be employed in future Recommendation Systems.

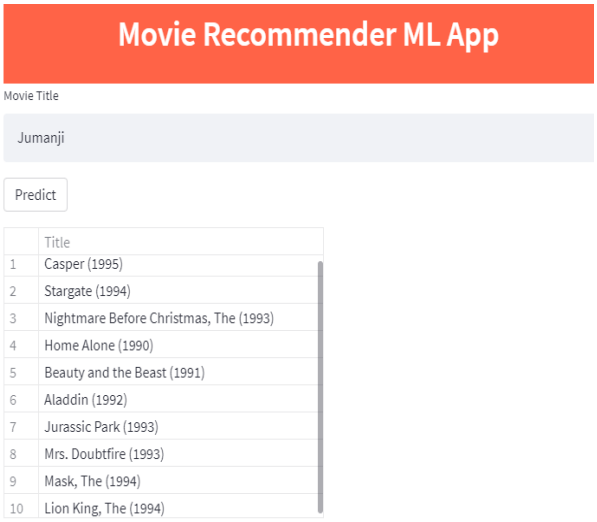

Figure-16: Movie Prediction Result

5. CONCLUSION

In AI based assistant, online selling platforms, social networking sites, and many other formal and informal sectors, recommender systems (RS) are now frequently used.

Since its inception in the mid-1990s, RSs research has advanced. Machine learning (ML) techniques, which allow machines to understand from user data and tailor suggestions much more, are a significant advancement in the history of RS. Machine learning is one of subset of Artificial Intelligence (AI) that includes algorithms that aim to foresee the outcome of data to be processed. In the disciplines of image identification, search engines, and security, machine learning has achieved significant advances. However, there are other algorithms in the ML field that have been reported in the literature, each with its own set of properties. There is no classification scheme for algorithms in the literature that shows which environments they are best suited for. As a result, selecting an ML algorithm for use in RSs is tricky. Furthermore, researchers in RSs lack a comprehensive vision of trends in Machine Learning Algorithms adoption, making it difficult to identify where to focus their field of study called research efforts.

Scientists and Developers on the other hand, need to determine which SE areas lack of enough assets or tools for RSs development. This paper then suggests a comprehensive review of the ML algorithms used in RSs, as well as what SE domains can help with the creation of such RSs.

We looked at the domains where RSs using an ML algorithm were authenticated during the systematic review. Due of the ease with which test data may be retrieved, movies, articles, and product reviews are the three popular domains.In the movie realm,MovieLens is one and IMDb the other are multiple online collections of movie ratings. As a result, we used the SVD and KNN Algorithms to build this dataset. In both RMSE and MAE , KNN has a higher value than SVD. The recommended movie in KNN is more precise than SVD and in each value of K in cross-validation, it is seen that KNN is much better. Hence, KNN is a better model in movie recommendation than SVD.

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Generation of Simple Symmetric Key Generation Scheme Based on Channel Reciprocity for Wireless Communication

[1]Srividya.L,[2] Dr.P.N.Sudha

[1]Dept of ECE,Dayananda Sagar College of Engineering [2]Dept. of ECE, K.S. Institute of Technology

[1]srividyanag@gmail.com, [2]pnsudha@gmail.com

Abstract.

In this paper we have designed an algorithm to generate a symmetric key for encrypting the data and making it secured to transmit over a mobile wireless channel using physical layer security parameters. The term physical layer security is used as the physical layer parameters of a wireless channel are used to generate the key removing undesirable attributes of the wireless channel such as noise, attenuation, delays etc. The obtained channel parameters are random in nature but are correlated between the sender and receiver channel.[1]

We have designed the key generation algorithm based on reciprocity theorem and the key generated at legitimate receivers have a better BER performances over the adversary's node which is though assumed to have full information about the key generation algorithm and located right next to the legitimate user.

Keywords. symmetric key generation, channel reciprocity, Bit error rate, Wireless mobile communication, Rayleigh channel, MATLAB®, Simulink®.

1. INTRODUCTION

Despite the popularity of wireless systems in every application these days, wireless communication still falls short to fully fledged implementation because of security. Due the broadcast nature of the medium, anyone who is in the vicinity of the transmission range can receive the signal which leads to a serious security issue of eavesdropping. This not only endangers the confidentiality of the information but also integrity between legitimate users. [12]

Key generation and its management play a prime role in secure communication as however strong the encryption algorithm might be but if the key is compromised, strength of the encryption algorithm becomes trivial. Hence our research work is focussed on secured key generation algorithm for symmetric encryption as most of the symmetrical encryption algorithms are complex, low cost and secured but distribution of the key is one a tedious process .Hence this drawback is overcome in this proposed algorithm, here we share the key in a decentralized manner.[2]

Traditional key generation and management schemes suffer either by high implementation cost or complex computational abilities and get compromised when the adversary has higher computational abilities. [3]

Wireless physical layer security approaches can prevent eavesdropping without upper layer data encryption. This technique which is based on channel reciprocity is appealing due to its ease in implementation, less energy consumption and low computational complexity. .[1],[4],[12]

However, such techniques are hindered by time-varying wireless channel conditions and they are typically feasible only when the legitimate partners in the Wyner's wire-tap channel model have an advantage over the source-eavesdropper channels.[4], [5]

We have considered a wireless SISO Rayleigh channel as it is suitable model for urban environment on radio signals, for the correlated measurements between legitimate users, to generate the symmetric key. [6] The impulse response of the channel, which is same when correlated observations are done from both the sender and receiver sides is estimated and converted in to the binary data. This binary data generated is used as key for symmetrical encryption.

Similar key generation setup is made at the adversary's side assuming that it is few meters away from the link.

Sender encrypts the data with its own key and transmits the data over an open wireless medium where the legitimate users and adversaries receive it and tries to decrypt with their respective keys.[9]

Results show a better BER at legitimate receiver's compared to the adversary's who is just few meters away from the legitimate user and assumed to have full information of key generation algorithm.

The rest of the paper is organised in this manner, section 2 describes the proposed system model. Key generation algorithm is shown in the section 3. In Section 4 implementation of the proposed scheme is discussed. We have results in section 5, Conclusions and Future scope is suggested in the last section 6.

2. SYMMETRIC KEY ENCRYPTION

There is a shift in the standard from developing high computationally complex encryption algorithm to secure secret key generation for any simple encryption algorithm.

Symmetric key generation is popular due to its simplicity, less complex especially under restricted environment such as in computation, memory, power etc. The only criterion is that legitimate users has to posses same secret key .

This is really challenging for a open medium such as wireless where the information is broadcasted and can be easily captured by the adversary.

3. WIRELESS CHANNEL CHARECTERISTICS FOR KEY GENERATION

Wireless key generation is based on the channel characteristics and their variation over the various domains like time, frequency and space.

phase ,received signal strength, narrow band channel impulse response, multiple channels, relative node distance, angle of arrival, special equipment like reconfigurable antennas, jamming mechanisms, IR-UWB channel impulse response and so on are the some of the attributes from which the keys are generated.

Some of the key generation models with wireless channels are Source model, Extended source model, Wiretap channel model, Source-emulation channel model, Reciprocity based channel model , Alternate models.[3]

4. PROPOSED SYSTEM MODEL

The block diagram as show in the Fig: 1. shows the Wyners model for the proposed scheme. At sender's node (Alice) we have an information source which contains the critical data to be transmitted to the legitimate receiver node (Bob), followed by key generation block which is explained in detail in the next section. The generated key is encrypted using one-time padding encryption scheme which is supposed to have perfect secrecy according to Wireless Information-Theoretic Security [5], [8].

Encrypted data is transmitted over a wireless Rayleigh channel which is assumed to be received by both legitimate receiver and the adversary (Eve), who has the same key generation algorithm as legitimate receiver.

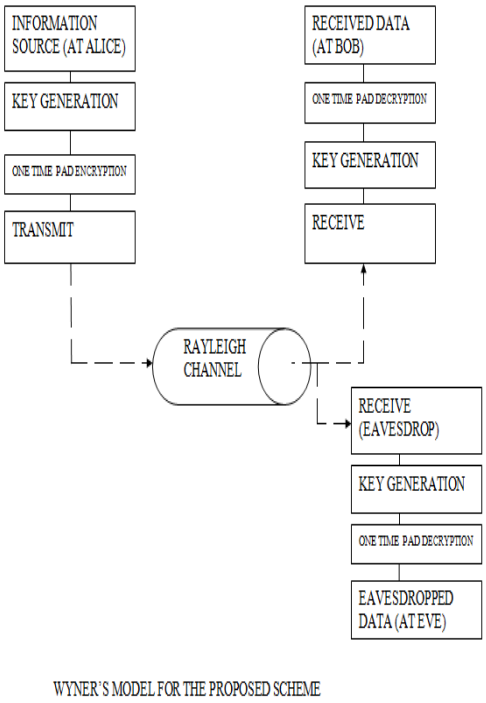


Fig: 1 Proposed scheme

5. KEY GENERATION ALGORITHM

Step1: Send a random binary data (X) into the channel and measure the output(Y).

Setp2: Measure the response H=(Y/X) using inverse Fourier transform.

Step3: Quantize H using a uniform encoder and convert it into bits which are used as key in encryption/decryption process.

Setep4: Repeat for each frame of data.

6. IMPLEMENTATION

The key generation scheme is implemented using Simulink® as we try to measure channel response simultaneously at Alice, Bob and Eve. A random data is generated using Bernoulli random generator block which is modulated by QPSK block and given into a SISO Rayleigh channel.[10] as shown in Fig:2.

Within the key generation block the system impulse response is measured using Discrete Transfer Function Estimator block and converted to time domain using IFFT block (h (t)). The h (t) is quantised using a uniform encoder block and converted into binary data using integer to binary conversion block. The generated output is forwarded to MATLAB® workspace for encryption and transmission. The entire key generation setup is made exactly as Bob at the Eve's except that the channel is multiplied by the variance which is characterized by their respective distances.

Standard deviation of each channel is assumed as 1/distance for a simple transmission.

Channel = sqrt(variance)*(randn(1,N)+j*randn(1,N)); (1)

where N is the random number distributed over a Rayleigh function.

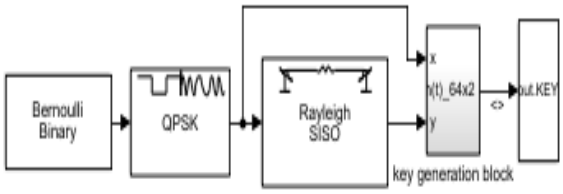


Fig 2: Key generation simulation

The proposed system model is implemented using MATLAB®. [11]

A random binary data is generated and is encrypted using sender's secret key. The encrypted data is modulated and transmitted over a wireless Rayleigh channel. Both at the Bob and Eve, the data is received, demodulated and decrypted using their respective keys.

7. RESULTS AND IMPLICATIONS

The BER of each tranmission for various Eb/N0 levels is measured at both Bob and

Eve. Four different scenerios are studied by placing Eve almost (1)at Alice ,(2)between Alice and Bob (3)at Bob (4)away from both Alice and Bob. Illustration of these cases is as shown in the Fig.3.

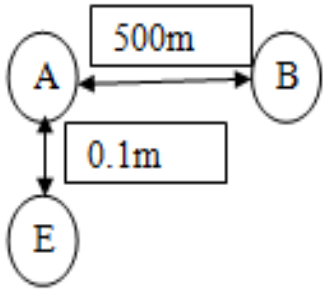
Table. 1. Shows the correlation between the generated keys at Bob and Eve. It is seen that key correlation is of low degree even when she is at Alice and Bob location but experience different channel response and hence derive a different key with low degree or no correlation between them.

Fig: 4. show the comparison of BER Vs Eb/N0 at Bob and Eve for the given scenarios.

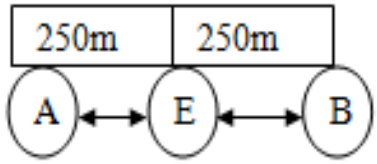
As we can see a typical BER curve for Rayleigh channel at Bob's by successfully decrypting the Alice's data with the Bob's key which was generated in a decentralised manner. Whereas Eve's BER is constantly high as key mismatches with the Alice's.

keysize=256, Doppler frequency=384Hz/70kmph,KGR=6bps				
Case	1	2	3	4
Bob-Alice(distance in m)	500	500	500	500
Eve-Alice(distance in m)	0.1	250	500	750
key correlation(Bob-Eve)	0.0409	-0.0465	0.0127	-0.0013
key correlation(Bob-Alice)	1	1	1	1

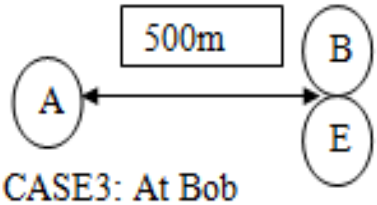
TABLE: 1 COMPARISON OF KEYS FOR CORRELATION



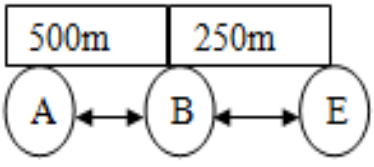
CASE1: At Alice



CASE2: Between Alice and Bob

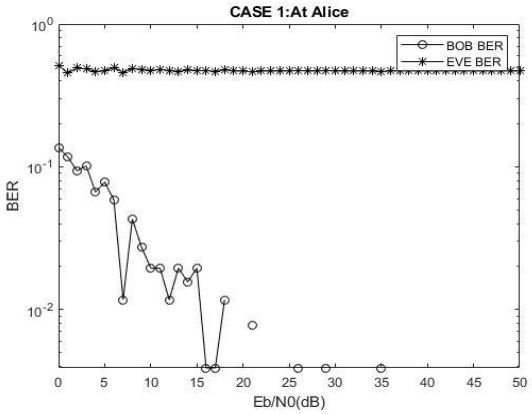


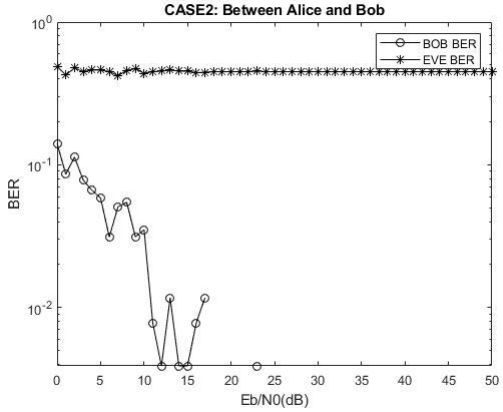
CASE3: At Bob



CASE4: Far from Alice and Bob

Fig: 3 Different scenarios for Eve's location


CASE 1:At Alice
BOB BER
EVE BER
BER
Eb/N0(dB)


CASE2: Between Alice and Bob
BOB BER
EVE BER
BER
Eb/N0(dB)

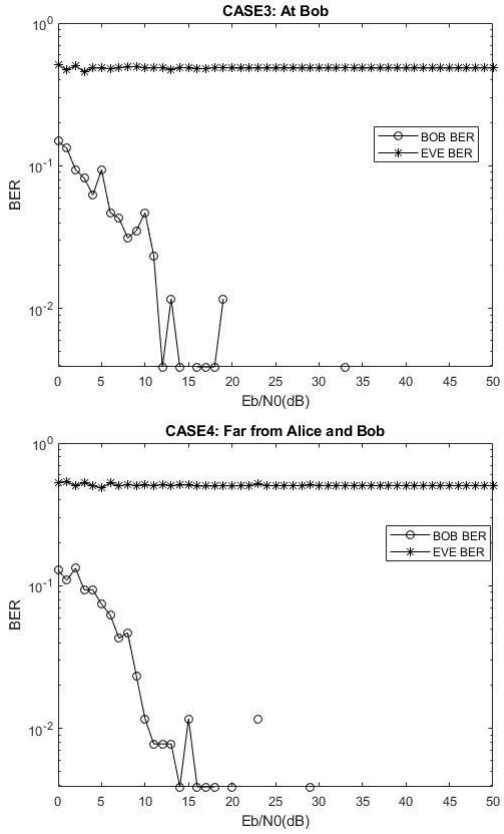


Fig: 4 comparison of BER performance for transmission of encrypted bits at BOB and EVE over Rayleigh channel.

	BER							
distance from Alice (in m)	500	0.1	500	250	500	500	500	750
Eb/N0 dB	bob	eve	bob	eve	bob	eve	bob	eve
0	0.117188	0.484375	0.15625	0.492188	0.140625	0.53125	0.15625	0.5
5	0.058594	0.496094	0.105469	0.535156	0.0625	0.492188	0.082031	0.464844
10	0.015625	0.523438	0.011719	0.542969	0.0234375	0.5	0.042969	0.464844
15	0.015625	0.507813	0.003906	0.542969	0.00390625	0.488281	0	0.46875
20	0.003906	0.503906	0	0.539063	0.0078125	0.492188	0.007813	0.460938
25	0	0.507813	0	0.539063	0	0.484375	0	0.46875
30	0	0.507813	0	0.539063	0	0.484375	0	0.46875
35	0	0.507813	0	0.539063	0	0.484375	0	0.46875
40	0	0.507813	0	0.539063	0	0.484375	0	0.46875
45	0	0.507813	0	0.539063	0	0.484375	0	0.46875
50	0	0.507813	0	0.539063	0	0.484375	0	0.46875

TABLE:2 . COMPARISON OF BER VS EB/N0 AT BOB AND EVE

8. CONCLUSIONS AND FUTURESCOPE

Based on the channel reciprocity, symmetric keys were generated using the parameters of the mobile wireless channel in a decentralised manner. The symmetric keys of the legitimate users were correlated and identical whereas key generated by adversary's had low degree correlation/no correlation. Hence the overall BER performance at the legitimate receiver node was outstanding compared to that of adversary's.

This work was conducted for a theoretical Rayleigh channel model, further it can be extended to V2V scenario by developing complex channel models and different Doppler's scenarios and taking space dimension into consideration.

Also the BER performance of the legitimate link can be further improvised by suitable adaptable error control coding techniques hence achieving secured and errorless wireless transmissions in mobile scenarios. [13]

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MusicBox – Face your new mood

Gangarapu Tharun Kumar
Student
tharunthammy600@gmail.com

Koppolu Leela Krishna
Student
leelakrishnakoppolu@gmail.com

Priyanka Bharti
Assistant Professor
REVA University

Konduru Rupesh
Student
rupesh06082000@gmail.com

Nukala Naveen Teja
Student
naveentej.nukala@gmail.com

Abstract:

In recent years, Because of its promise in the fields of computer vision and human-computer interface, facial emotion detection has gotten a lot of interest. There have been several techniques and applications developed and realized as a result of the ongoing research in this sector. This paper offers a music recommendation application for expression identification that can detect the user's expressions and automatically play a song that improves the user's current mood. We did some research into how music might improve people's feelings in the near term, to collect information and supply clients with a selection of music tracks that are effective at elevating end user moods. The proposed application is developed using Flask, HTML, CSS and JavaScript that identifies expressions, and if the individual is experiencing a sad feeling, a certain song will be played to help him feel better. If the identified emotion is good, on the other hand, suitable music will be played to amplify the pleasant feelings. We effectively developed the suggested Music recommendation application utilizing the Haar-Cascade Classifier method and the CNN.

Keywords - Emotion detection, music recommendation application, Haar-cascade classifier, CNN, Flask, HTML, CSS.

I. Introduction:

Individual communication is an important component of daily living. It communicates precise details and millions of pieces of information between humans, whether through words, tone, or emotion [1]. The easiest way to understand individuals in conversation is to look at their faces and bodies. Face expression, in particular, is a kind of nonverbal communication and is one of the most essential aspects of human communication. The activity of more than one face muscle or skin is characterized as a facial expression. These activities aim to communicate a person's facial emotions, such as happiness, sadness, neutral, anger, and surprise [1]. Facial detection and expression detection are two distinct concepts that have recently sparked attention in domains such as digital image processing, computer vision and pattern recognition [5]. Face detection is a two-step procedure that involves locating faces in a photograph or video, regardless of whether or not

they belong to a person. The program then forms a box around every face in the image, regardless of mood, alignment, face position, brightness, or complex backgrounds Emotion detection is one of the most common facial expressions and the most common way of assessing a person's feelings. Expression detection is now widely employed in a variety of applications, including Tracking, image investigation, multimedia indexing, citizen application, security, and adaptive computer-human interfaces in multimedia environments are all examples of smart card applications [15]. Furthermore, emotion detection is a more reliable and cost-effective technique to learn what customers think about their items. Most businesses and stores employed traditional marketing methods such as advertising, sale points, client feedback, and price in the past. These approaches may be effective in some circumstances, but they are costly, time-consuming, and potentially unreliable.

II. Literature Survey:

Facial expressions are regarded as the most significant aspect of human communication because they allow us to discern the intentions of others. People often derive the emotional states of others, such as happiness, anger, sadness, and surprise, through two major channels: speech tone and facial expression [1].

Learned a lot about how to use the Haar-cascade classifier to detect the faces from the images from the paper published by Viola and Jones who have developed the Haar-cascade classifier [2].

According to Mehrabian [5], nonverbal communication accounts for two-thirds of all human communication, with facial expression accounting for the majority of this percentage. While verbal communication only conveys one-third of emotion. As a result of its academic significance and economic potential, face emotion recognition is currently one of the most important disciplines in computer vision. Looking back at the studies on this subject from its start, we can see that the methods utilized by researchers may be split into two categories: traditional and neural networks-based methods.

Meanwhile, the researchers used deep learning approaches to lessen the reliance on face physics models and replace it with end-to-end learning models. There are other deep learning models, but the Convolutional Neural Network (CNN) is the most extensively used model in the field of face recognition. Have gone through a paper published on Convolutional Neural Networks [3], where we have learned a lot about CNN and how to detect the user’s mood in real-time.

Flask is a simple and lightweight Python web framework that provides handy tools and functionalities for constructing Python online applications [4]. We have gone through a paper on Flask and python technology to know about how to create an online application.

According to D. Mazinanian and N. Tsantalis[11], learned the syntax and new techniques to do frontend styling to the HTML templates.

According to Sharma, Aakanksha [12], and an online site- www.w3schools.com [13], tried to learn about HTML and its tags to create beautiful templates for our application.

III. *Objectives:*

The main objective of the project is to capture a person's feelings through the expressions on their face. A music player is meant to capture human emotion using the web camera interface accessible on computing platforms. The program captures the user's data and image, then refines it using image segmentation and image processing algorithms. Then it takes characteristics from a target human's face and tries to figure out what emotion he or she is feeling. The purpose of the project is to lift the user's spirits by playing music that is suited for the scenario.

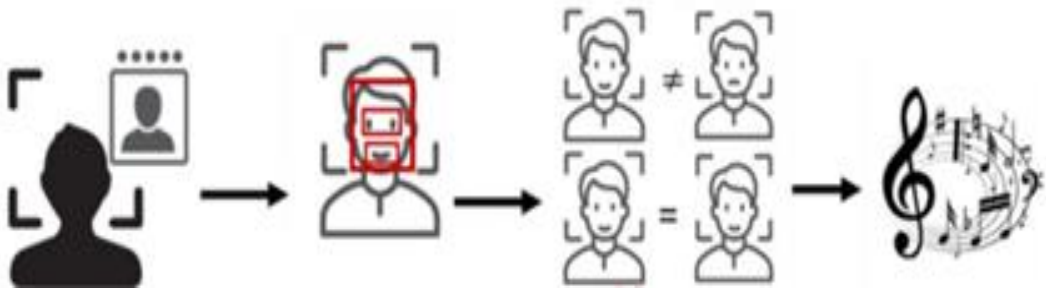
By capturing the user's image, the user's needs can be met. The best way of communication has existed since ancient times. Facial expression recognition is the most well-known form of expression analysis.

IV. Methodology:

The suggested application is a music recommendation software that can automatically recognize emotions. The photos that will be used as input to the proposed application are captured using a camera, as shown in Figure 1, after which it is delivered to the expression detector, which classifies them into one of five categories: "Happy," "Neutral," "Sad," “Surprise” and "Angry."

Figure - 1

Songs will be played based on the expression of emotion identified. Users will be able to listen to party tunes if the user expression is classified as happy, for example. We utilized a Kaggle FER dataset with 24,000 pictures representing four different emotions: happy, neutral, angry, fear, surprise, and sadness. The phases of the suggested approach are depicted in Figure 2.



User Image Capture Face Detection Emotion Detection Play music

Figure -2

A. Image Capturing

As a first stage in the proposed method, we use a built-in laptop webcam to capture an image of the user's face. One face in the frontal position against a continuously illuminated backdrop is required for the recommended method to successfully analyze a face image. Also, nothing on the user's face, such as spectacles, should hinder the detecting process. We allow the user to retake the image to acquire a picture that fits the proposed application requirements if the original image fails to do so.

B. Face Recognition

The system will recognize the face using the Viola-Jones approach (Haar-cascade classifier) after taking the image. This algorithm is recognized as one of the earliest real-time object recognition foundations. Simply said, Viola-Jones scans images and detects the characteristics of the face in the image using a sub-window. The image is reduced to merely containing the face once it has been identified to increase the proposed system's performance. The flowchart in figure-3 depicts the entire procedure.

C. Emotion Detection

The end user's emotion must next be determined. To accomplish so, we use CNN, a Tensor Flow technique that is well-known for facial emotion detection. Finally, we are able to recognize facial expressions.

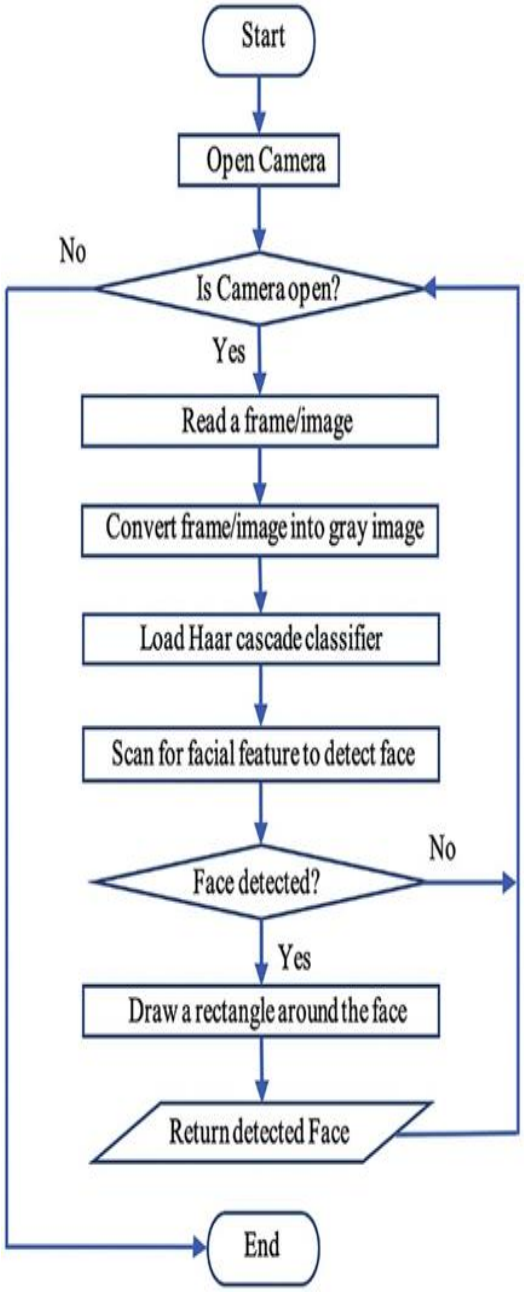


Figure – 3

D. Playing the appropriate Emotion enhancement song

The proposed system will play the appropriate song based on the identified emotion. Because there are four emotions, we have four different emotion-based songs database with carefully selected music samples. The party songs will be active for happy emotions, while the happy songs will be activated for neutral emotions. For unpleasant emotions such as sadness and anger, happy songs will be played to improve the user's mood.

V. Experimental Results:

We were able to effectively construct a music recommendation application that uses the Haar-Cascade classifier with the help of CNN to recognize the emotions expressed in the suggested work and depending on the obtained picture, to imply an appropriate song will be played, with the goal of to enhance the user's experience. Figures 4, 5, and 6 illustrate a snapshot of the proposed system and how it generates a suitable list depending on the detected mode.

Figure – 4

We have trained the model with a 24,000 images dataset and tested it with 6,000 images. Finally, we got an accuracy of around 69% as in figure – 7.

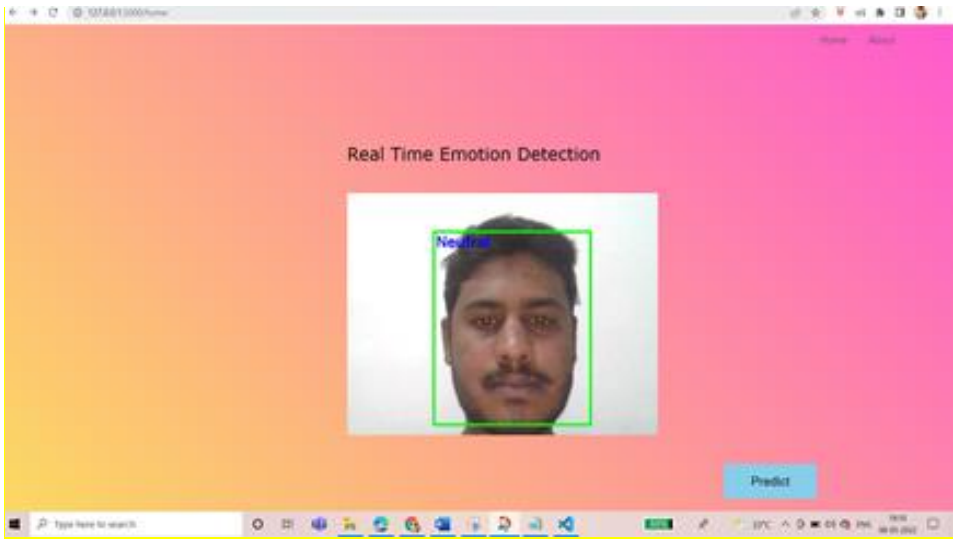


Figure – 5

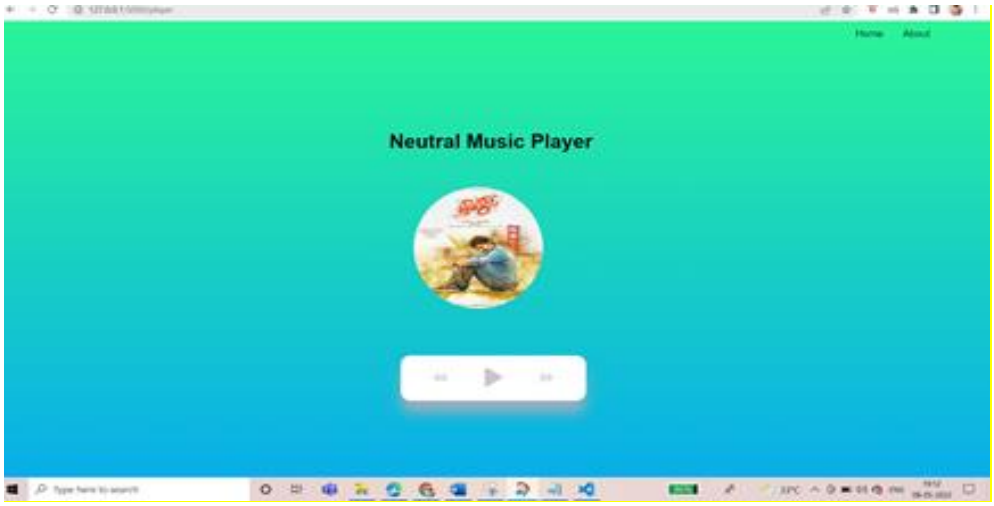


Figure - 6

Figure - 7

Confusion matrix as shown in figure – 8.

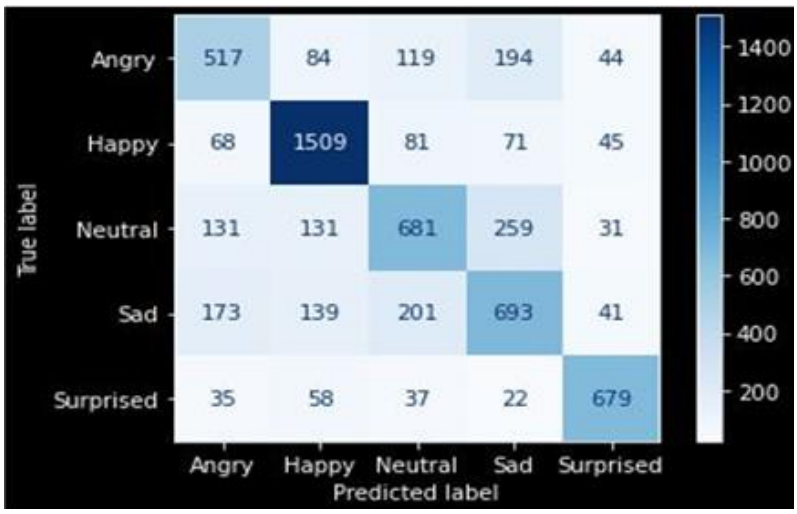


Figure - 8

VI. Conclusion:

We present an outline of how songs can affect a end user's mood and how playing a song automatically can improve a user's mood in this paper. We also demonstrated approaches for detecting emotions. We employed MobileNetV1 Tensor Flow and the viola-Jonze Algorithm to develop the proposed system. The technology in place was able to detect the user's emotions. The algorithm was able to distinguish happy, sad, neutral, and angry emotions. After assessing the user's emotion, the suggested system created a playlist for the user that included music that matched the mood. The song was played to boost the end user's emotion after study on what sort of song is suited for each mood.

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E-Auction Application based on Blockchain

Kambam hemanth sai reddy
hemanthreddy9949883576@gmail.com
School of CSE
REVA University

Anilkumar Ambore
anil.ambore@reva.edu.in
School of CSE
REVA University

G satya Vikram
satyavikramg@gmail.com
School of CSE
REVA University

G venkata Sathish
venkatasathishgorijala2000@gmail.com
School of CSE
REVA University

G L naveen kumar
glnaveenkumar193@gmail.com
School of CSE
REVA University

Abstract.

Integration services, such as e-commerce transactions, transportation, and so on, have progressively revolutionised people's everyday lives as a result of the Internet's popularity. E-auction, which allows bidders to directly bid on items via the Internet, is one of the most popular e-commerce activities. Because the third party plays such an important role in enabling trade between buyers and sellers during the auction, an extra transaction fee for the intermediaries is required in the event of a sealed bid. It also never guarantees that the third party is reliable. To address this issue, we are developing an Android application that is powered by Blockchain Technology, ensuring that the databases used for transactions are dispersed and cannot be tampered with.

Keywords: Blockchain, E-Auction, E-Auction System using blockchain, Web3.

1. INTRODUCTION

The blockchain is a peer-to-peer access network that allows nodes to trust one another. Each site may interact, authenticate, and transfer data to others in a secure manner. As a result, the centralized middleman may be eliminated in the decentralized system, lowering transaction costs. In an era where practically all blockchain applications are booming, this is one such technology that will alter the world in numerous ways. We have discovered that traditional online e-auction providers may be readily tampered with or influenced by the supplier. Typically, these e-auction firms demand a hefty fee for their services.

A blockchain-based online auction platform would be a huge step forward from present auction platforms. Auction data and bids will be difficult to tamper with thanks to the blockchain framework. Transparency, dependability, and scalability will be key features of the platform. Anyone may use this market to auction off anything, and bidders can bid and acquire items without fear of being scammed.

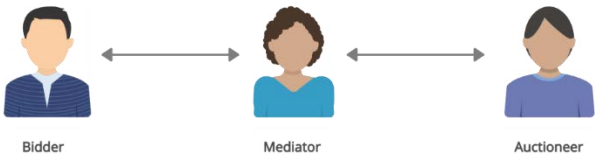


Fig.1 shows how traditional e-auction systems work

I. Literature Survey:

Ref. No.	Authors	Paper	Summary	Ref. No.
[1]	llichetty S Chandrashekar	Auction-based mechanisms for electronic procurement	In this project Bidders can place several bids during a public bid, which is why it's also known as a multi-bidding auction. Bidders	[1]

			encrypt the bill and only transmit it once in a sealed bid. The auctioneer compares all the bills if the time is up. The sealed bid is won by the bidder who offers the greatest price.	
[2]	Shih-Hsin Chen	Blockchain-based smart contract for the bidding system.	The smart contract in this article includes the auctioneer's address, the start auction time, the deadline, the current winner's address, and the current highest price. In the experiments, accounts are established with the Ethereum wallet.	[2]
[3]	Shengbao Yao	A Model in Support of Bid Evaluation in Multi-Attribute E-Auction for Procurement.	In this work, management science methodologies are discussed as potential solutions to various sorts of decision-making problems. The focus of this study is on bid evaluation in multi-attribute e-auctions for procurement.	[3]
[4]	Wen Chen	A Simple Efficient Electronic Auction Scheme.	This work offers a novel quadratic residue-based electronic auction mechanism that is both simple and efficient. Their technology meets the fundamental security requirements for a sealed-bid auction system.	[4]

In his paper "Auction-based procedures for electronic procurement," llichetty S Chandrashekar [1] claims that E-auctions are currently separated into two categories: public bid and sealed bid. Bidders may raise the price in order to bid on objects in a public auction. As a result, the bidding price keeps rising until no one is willing to pay any more. A bidder is proclaimed the winner if he provides the highest price for products. A public bid is sometimes known as a multi-bidding auction since bidders can put multiple bids throughout the auction. In a sealed bid, bidders encrypt the bill and send it just once. If the time is up, the auctioneer compares all of the bills.

Shih-Hsin Chen [2] of Cheng Shiu University suggested a Blockchain-based smart contract for the bidding system, claiming that the smart contract, which was designed in 1990 and implemented on the Ethereum platform, can ensure that the bill is safe, private, non-reliable, and unalterable. The smart contract includes the auctioneer's address, the start

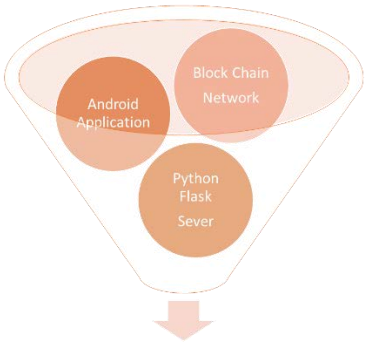
auction time, the deadline, the current winner's address, and the current highest price. In the experiments, accounts are established with the Ethereum wallet. In the miner stage, the Miner Gate is utilised to obtain money in order to pay the transaction fee. At the recording step, the blockchain nodes are synced to create smart contracts.

Shengbao Yao [3] of Zhongnan University of Economics developed "A Model in Support of Bid Evaluation in Multi-Attribute E-Auction for Procurement," stating that Bid evaluation is a vital but challenging problem in a multi-attribute auction. Management science techniques could be useful in resolving these types of decision-making problems. The focus of this study is on bid evaluation in multi-attribute e-auctions for procurement. The recommended model uses ELECTRE-III, an outranking-based multi-attribute decision approach, to analyse the buyer's preferences. As proven by a bid assessment example, the provided technique may be well suited as a decision-making tool for multi-attribute e-procurement.

"A Simple Efficient Electronic Auction Scheme" was proposed by Wen Chen [4]. This work offers a novel quadratic residue-based electronic auction mechanism that is both simple and efficient. Their technology meets the fundamental security requirements for a sealed-bid auction system.

Marco Iansiti [5] et .al “The Truth About Blockchain” article is a study about block chan in which the authors says the usage of smart contracts in the development of modern applications. The importance of smart contracts in the blockchain word is clearly discussed in this article.

II. Modules Identified



The proposed system can be divided into three modules

1. Android Application
2. Python Flask Server
3. Blockchain Network

1.Android Application :

The Android application is used as a user side layer for the application and is built in flutter.

2.Python Flask Server :

The Python Flask Server is used as the backend for the Android application.

3.Blockchain Application:

The Block chain network is used to store the transactions happening in the application.

III. Methodology:

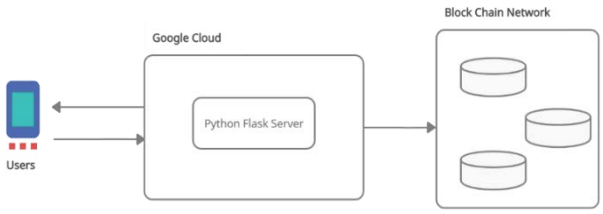


Fig 2. Explains the Methodology of the project

The Project uses python flask as the backend for the application wherein the frontend of the application is made with flutter.

When the users logins with th application the user is authenticate using the firebase authentication framework and gives the user an unique identity. Various data like images, descripition of items are stored in the firestore database and ared used by the android application.

Metamask is used to provide the transactions in the blockchan network.

In an E-Auction platform, The Bidders can place direct bids on items through the Internet. Because the third party plays such an important role in enabling trade between buyers and sellers during the auction, an extra transaction fee for the intermediaries is required in the event of a sealed bid. It also never guarantees that the third party is reliable.

IV. Results

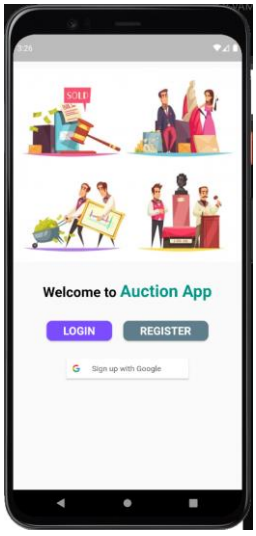


Fig 1. Shows the Home Page of App.

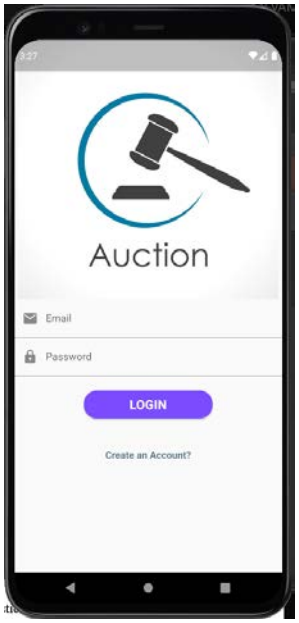


Fig 2. Shows the Login Page of App.

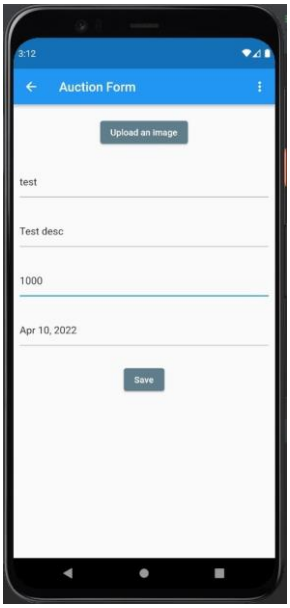


Fig 3. Shows the Item Uploading Form.

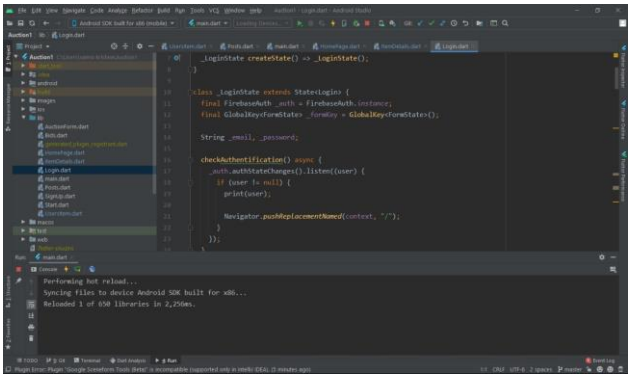


Fig 4. Shows the Android Studio file for login page.

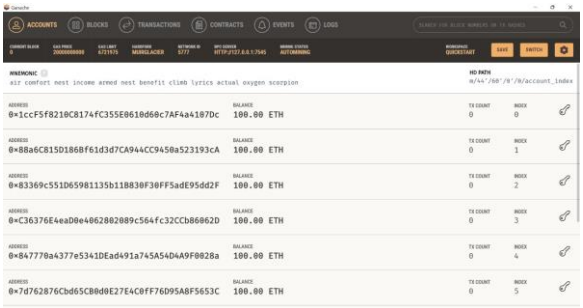


Fig 5. Ganache - Truffle Suite Ethereum Block Chain Simulation.

V. Conclusions:

We conclude that a blockchain-based E-Auction System can drastically change the way how auctions happen. The Cross-Platform application can be very useful for the user to easily conduct auctions over the internet without any physical interaction and in a secured fashion using technologies like blockchain

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Smart Home Control

BinduShree DC, Aman Dubey[1], Komal N[2], Vinay Kumar Singh[3], Brotin Sharma[4]

[1] dubeyaman234@gmail.com , [2] komalngowda16@gmail.com ,

[3] vinaykumar13120@gmail.com , [4] brotin.sharma@gmail.com

Abstract.

We are in quest of time that we can use for our comfort in our daily hectic lives, and with the rapid advancement of technology, we may think of and use numerous technologies in our day-to-day lives to make our lives easier and save our valuable time. As a result, SHC was born (smart home control). In this many devices are attached with a single demonstrator which combines to construct an IoT. Smart home control is our topic which brings Amazon Web Services, RPi & Message Queuing Telemetry Transport app whole combination beneath one rooftop and regulated using an app with the security of data using AWS. This is built in such a way that it controls the devices wisely and secures the data that only the user can check. The integration of IoT with AWS is good in terms of user data security. In this, the blades of the fan rotate according to the temperature inside the room, the lights which sense the environment whether it is dim or lighting according to this it will switch on & off with the help of an app, and the door sensor can sense If the door is open or someone is breaking in, the door sensor gives the user a notice using simple notification service. Hence the app will be updating the user with the results and saving their time and helping in avoiding irrelevant worries.

Keywords—Amazon Web Service Simple Notification Service, IoT, Message Queuing Telemetry Transport, Amazon Web Services, Amazon Web Service Dynamo Database, RPi.

1. INTRODUCTION

In 1966, home automation was introduced to make user's living easier and more feasible. Jim Sutherland is the inventor of ECHO IV that handles temperature and other appliances. As the forefront emerges in 2021, smart home techniques have gathered a large number of customers due to advancements in automatics. Smart Home is a subgenre of everyday computing that covers advanced technologies with the primary goal of providing convenience, protection, smart living, and efficiency improvements to the consumer. Internet-of-Thing has dominated this advancement of technology in recent years. A program that collects data and runs using detectors. IoT-based smart home control collects data from numerous sensors around the house and exchanges it with other devices that work according

to the individual's preferences. This study document describes an Internet-of-Things-based smart house with intelligence that regulates lights, and fan swiftness, and alerts the homeowner concerning the safety of the main door, all while safeguarding the home's sensitive data. We can use our smartphones to keep an eye on these devices. The house's lighting is controlled via an app, and while the fan's speed adjusts in response to variations when the temperature and humidity of the surrounding environment change, AWS sends a message to the mobile application. Different kinds of home control with various thoughts are available in many research publications. Combining machine learning and IoT has the potential to create an intelligent control system.

Voice command, clapping, or just instructing through the app to turn on/off lights is common in most smart home controls, but it might be troublesome when the user is outdoors or unable to deliver a signal. As with many other parts of Smart Home Control, an App can be used to modify the fan's speed, though this doesn't always correspond accordingly with house temp. A theft alarm is included in several Sensor-based surveillance devices that can be triggered again for the tiniest of reasons, bringing annoyance to the user. Personal data theft has become increasingly widespread as technology has advanced. To address this, we are storing our sensor readings on AWS, Amazon Web Services is a division of Amazon that provides cloud computing platforms and secures user data. Limiting access to those whom the user chooses to share it with. AWS IAM, or AWS Identity and Access Management, is used by users to access the data. AWS IAM assists users in securely managing access to AWS services and resources.

2. LITERATURE REVIEW

In the current system, research into smart home control focuses on resolving issues such as power consumption range of operation and overall system cost. Various means, including SMS and Email, are employed to automate the appliances. The research described here focuses on making a wireless smart home accessible quickly and easily. Everyone has access to this automated system, which helps to eliminate manual labor. It's low-cost, safe, and convenient. In comparison to prior systems, access is quick.

Because of its multiple advantages, smart home control is becoming increasingly popular. The rise in demand for network-connected smart home control is due to the fact that it has lately gotten simpler and more affordable. In project [1,] we use an Internet of Smart home control automation based on the Internet of things to give the customer complete authority across all remote control aspects over her or his residence. The automation system will be controlled by the web, a central host Device and a packet PC running a Windows mobile application.

This study [2], which was published in 2021, proposes a more advanced home automation system that uses an Android application to control and monitor household gadgets. The Internet of Things is at the heart of this strategy . Every unique household without appliances is planned and executed with the need of any human interruption with the house computerization. In this framework, the Ras pi4 will be connected to a variety of detectors with the ability to measure degree and steaminess,sources of light, power, and other variables.

When it comes to the automation of smart homes and buildings, the internet of things (IoT) has played a critical role. IoT and cloud computing are used to automate smart homes and structures. Individuals occupying any property can enjoy their safety thanks to rule-based event processing, convenience and ease of use. This study [3] indicates usage of IoT in smart home automation was comprehensively explored in this study. After commands and controls were conveyed through electrical wire, it was adopted in the twenty-first century. The radio band interference had an impact on their signals.

As a result of growing scientific innovations that have better organized our lifestyles, home automation has increased in recent years. Almost everything has changed immensely, & everything is now mechanized. For a range of home automations, this research [4] presents a method for merging actuators, detectors and other info points. The system is called qToggle, and it operates by utilizing a computer's compatibility and ability. The foundation for a simple and standard communication mechanism is the Application Programming Interface (API).

In [5] literature, various home automation systems with various standards and implementations have been presented. The purpose of this research is to show how to use Arduino and Thing Speak to create a cost-effective home automation system using IoT. Almost every component of a smart home is controlled by software. The proposed approach saves energy, is eco-friendly, and extends the life of digital products. This study will present a mechanism for IoT developers and researchers to perceive, digitalize, and regulate dwellings in the future IoT. In addition, this study exemplifies how IoT applications may make life easier.

3. OBJECTIVES

The goal of this project is to create a Smart Home Control system that focuses on a few aspects of development.

- Create a system for home automation.
- Use devices that are simple to set up.
- Make it usable for inexperienced users or individuals with disabilities
- Make it expandable so that future add-ons can be added.
- Encourage standardization.
- To ensure data security.

4. PROPOSED SYSTEM

In this system, we are using Raspberry Pi and establishing an internet connection which will be integrated with Amazon Web Services. LDR will be used for the lighting purpose to detect the lighting around the surroundings which will be then connected to the MQTT application. We are using a sensor named DHT11, for temperature and humidity readings which will be uploaded to DynamoDB.

MQTT AWS services and a dashboard with python are used as software and python we used to code the Light Emitting Diode LDR, MQTT Dashboard, Temperature and humidity sensor and door sensors and the information was transmitted to Dynamo DataBase.

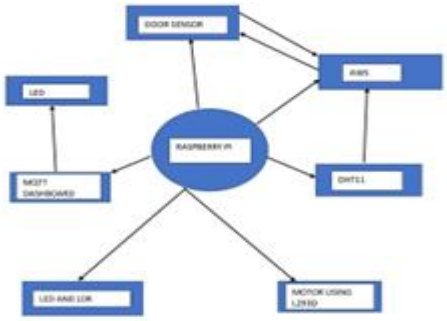

Diagram 1. Flow chart of our proposed system.

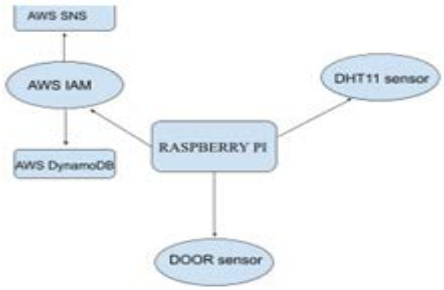

Diagram 2. Amazon Web Services Block Diagram

The workflow direction :
RasPi is the project's main hub and it's not only directly linked to the sensors, but it is also connected to Amazon Web Services Command Line Interface via the RPi's console. Because the console is also used for AWS instructions, the python coding is done using the python Editor on the RPi device. When it comes to lighting, LDR absorbs as much light as it can from its surroundings. If LDR captures any, according to our code utilizing the if-else statement,

LED is directed to produce a large amount of high abundant light.to shut down the LDR, on the other hand, notices a weak light and commands light emitting diode to switch on irrespective of the quantity of light that is available. In addition, the Message Queuing Telemetry Transport application is accessible linked to the light source, enabling the consumer to control. Depending upon their preferences, they can turn it on or off. Using the MQTT app, to run the system, the user must click a button. Python is used to programme the DHT11 sensor. The data from the sensors on a regular basis are sent to the AWS Database, which was built for the purpose of storing these facts. These are some of the services we've linked to DHT11, which is where the door sensor is stored, and DynamoDB information in the form of tables that were produced. It's the only way to get the data by users who have been granted access by the IAM service.

The following are the model and sensors that were used in this project:

A. HARDWARE REQUIREMENT:

MOTOR: A photoresistor is a type of LDR that decreases resistance when light passes through the Surface that is fragile.
Light Dependent Resistor, a photoresistor is a device that reduces resistance as a result of light falling on the delicate surface.
LED: Light When current passes through an emitting diode, it produces light.

1) Raspberry Pi:
The RPi 3 is a compact processor which can be utilized for coding.This boasts a I.4 gigahertz 64bit with four core CPU and double-band Wi-Fi four USB 2.0 ports, LAN, 4.2/BLE, and Bluetooth. This moves things around the motor. This motor has the ability to drive 2 DC motors parallelly.

Diagram 3. Raspberry Pi Board

2) DHT11:
It's a popular temperature and humidity sensor that uses an eight-bit microprocessor to produce temperature and humidity estimates. Serial data for temperature and humidity.

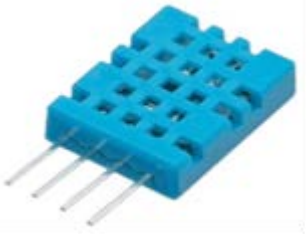

Diagram 4. Distributed Hash Table 11 sensors

3) DOOR SENSORS:
This is a magnetic sensor which permits the door to open and close. One part will be attached to the board, while the other will be free to move around.

Diagram 5. Door Sensors

B. SOFTWARE IMPLEMENTATION

We installed paho-mqtt, to control lights via MQTT by employing certain commands. The paho mqtt protocol creates an establishment with customers' applications. This message is published/sent by the broker. Subscriber refers to the person who receives the message. We had several snags along the way, but they were all resolved.

Urlparse takes this and validates the Address text, it provides an entity containing characteristics for each component with url. It gives you a better experience. A standardized method of storing resources

The next step is to establish a new user in Amazon Web Services Identity & Access Management, Secret and access credentials are shown. It was finished by visiting a particular location and entering the necessary information, after which it led you.We're taken to a welcome page that informs us that an account was successfully created containing the name of the user, to gain access, you'll need the secret and access credentials . In order to retrieve the table from the console. The use of commands was employed. AWS settings aws content index DynamoDB with the SNS.SNS that will be used by door Sensor to transmit notifications along with the topic's specifics. We had to execute the command, From the console, configure the message for SNS.

In terms of hardware, we utilized connecting wires to link the Raspberry Pi. A SNS, a Motor-engine power unit and a Distributed Hash Table 11 sensors are all attached to the breadboard underneath the LED-LDR.The following are the project's inputs and outputs:

1)Lighting (LED – LDR) is the first sensor.

If light is low or insufficient, the light from the environment serves as the input. The LED will then be turned on by the LDR. And what if the ambient light is sufficient, the LED can be turned off. Will be turned off

2)The Lighting sensor, which uses MQTT, is the second sensor.

The LED represents a glow in light which could be turned on and off using Message queuing telemetry transport app. "Light On" & "Light Off" applications are available. These can be used to control the LED.

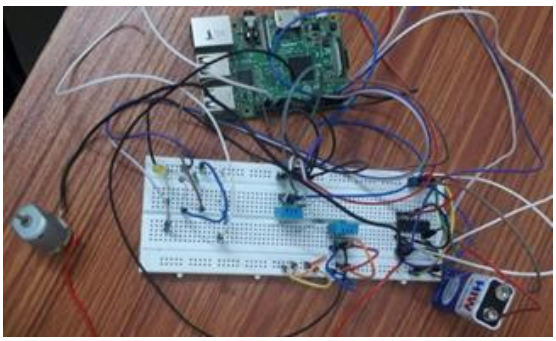

Diagram 6. Hardware Components

3) The sensor for thermal detection (Distributed Hash Table 11-Amazon web services)

The Distributed Hash Table 11 sensor is accustomed to monitor changes in temperature of neighborhood areas. The thermal sensor is also linked to Amazon web services, allowing the AWS DynamoDB to track the thermal and humid variations. Amazon web services and thermal sensors are linked to the RasPi using the AWS CLI, Dynamo Database index stores the corresponding temperature values.

4)Motor-Distributed Hash Table 11

Motor-Engine will spin at 20% of its regular speed if the temperature is between 5 and 15.This will revolve at the pace users set when temp falls somewhere in the range of Sixteen and Twenty three degrees Celsius at fifty-five percent.When the temperature is between 24 and 30 degrees Fahrenheit, it will spin at 70% of its maximum speed. If the temperature had risen to beyond 30 degrees. The motor-engine will spin at a constant speed 95 percent of the time.

5. RESULTS AND DISCUSSION

1)*Using Mqtt application and normal light*.

Both the Light Dependent Resistor, and the Application can regulate the lights, and the LED is successfully powered upon using Ldr.

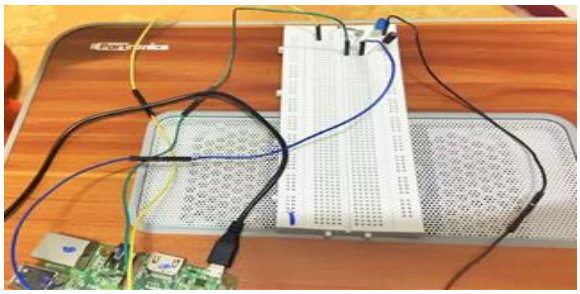

Diagram 7. Utilizing Ldr to switch off/on LED

As illustrated in Fig 11, our foremost accomplishment was to develop an on/off button for LED blinking using the Message Queuing Telemetry Transport Dashboard Application. With this, the user may turn on/off the lights from anywhere.

Diagram 8. The smartphone view of the MQTT app.

The desirable features are depicted in Figures 12 and 13. Whenever the "Light Off" switch is pressed, the LED turns off, but when the "Light On" switch is pressed, the LED turns on.

2) Temperature and motor speed Change

The information is typically collected using the DHT11 sensor. As illustrated in Fig 14, the humidity and temp are shown in the terminal. After successfully completing the account creation, the following step would be to use the DynamoDatabase to construct indexes. As illustrated in Fig 15, two tables were prepared for our purposes: one for SNS data and one for temp data. As seen in Fig 16, the table for temp difference stores the value handed down by the sensor. As per the data, the speed-engine of the motor changes in lockstep with the temp and humidity in the surroundings, as illustrated in Fig 17.

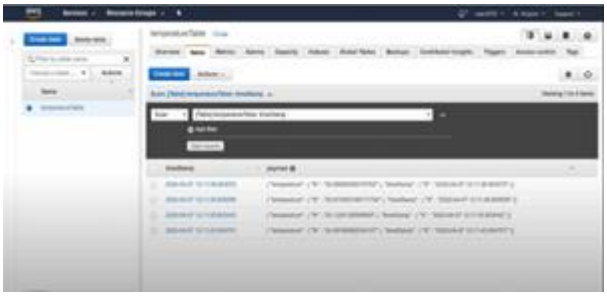

Diagram 9. Amazon Web service DynamoDB table

Diagram10. Humidity & Temperature in DynamoDB table

3) Door Sensor

This door detector keeps track of the progress of the doors and notifies the user if they are closed or open. Amazon web services are used to keep data records in DynamoDB, including the door status, and to send out an SNS notice. If the state of the door alters, the SNS links to the RaspPi using Amazon Resource Number and AWS CLI .
SNS is used to show the notice that warns the user each instant the door opens or shuts, as illustrated in Fig 19. The moment the door opens, it records the data, and when it is closed, it informs the state through notification.

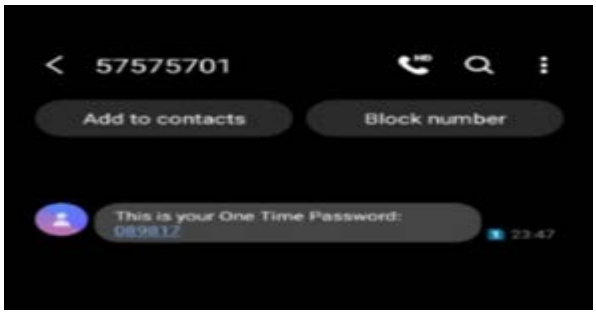

Diagram 11. Amazon Web service SNS alert

6. CONCLUSION

The advantages of merging Message queuing telemetry transport, the amazon web service application and Ras Pi to provide greater home automation functionality is demonstrated in our study. Using the surroundings and the user's choices to successfully alter the lights and fan speed. Tables are used to store and display data (temperature and humidity) taken by the DHT11 sensor using AWS DynamoDB. With Amazon Web Services,Access Management & Amazon Web Service Identity protects security of customer's information, which shall be viewed with a small number of persons if the user permits it.The primary purpose of smart home control is to provide the user with a trouble free and excellent lifestyle, with all functions and gadgets accessible with a single touch. The Ras Pi 3b plus combined with Ras Pi operating system was used to accomplish this project, as it has a greater processor response time (1.4GHz) and higher Ethernet throughput.In response to their surroundings, all of the devices listed above respond fast and appropriately.
For future development, the present scheme would be modified to include a power management mode, which will assist users by ensuring that when the system is turned on, all of the equipment linked to it spends the minimal energy possible, reducing overall power usage. Smart Home control will bring a huge change in day-to-day lifestyle in the approaching age, thanks to sophisticated technology. We can apply Machine Learning to forecast daily power use, keep track of it, and provide computed pricing.

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Emotion Detection By Facial Recognition and Song Recommendation

Raghavi P Madhwa, Rithika D Shetty, Rabiya Sadaf, Laxmi B Rananavare, Harini Reddy M

School of CSE, REVA University, Bangalore, India
laxmib.rananavare@reva.edu.in

Abstract

It is difficult for us to choose which music to listen to from a vast array of available selections. The main goal of our system is to give consumers with suggestions that are tailored to their tastes. The examination of the user's facial expression will help us in understanding of the user's current emotional as well as mental state. Music and videos are one area where there is a big opportunity to provide clients with a wide range of options based on their preferences and collected data. Humans use expressions to express their motive of speech. More than 70% of the users whom we have interviewed believe that at some stage in the future, the number of songs in their music collection will be so huge that they will be unable to find the song, one needs to play. By building this recommendation system, it might be helpful for a user in deciding which music to listen, hence bringing their stress levels down. There would not be any wastage of time for the user in looking up songs since the best track which will match the user's mood would be detected and music will be displayed to the user based on their mood. The photo of the user is taken from a webcam, and then an appropriate song from the user's playlist is provided that matches the user's demand, based on the user's mood/emotion.

1. INTRODUCTION

We express our emotions through our expressions. Music always helps us change our moods. Recognising a person's emotion and playing the song which, they wish to hear will comfort the person and calm them by giving a pleasing effect. The goal of our project is to capture a person's emotion through facial expressions. The system is made to capture the emotion a user shows via live camera interface present in the system. Now, after the emotion is displayed, the software takes a picture of the user and later using the image processing techniques, extracts the features from the user’s captured image along with the emotion expressed. The goal of this project it to help the user brighten their mood by

playing songs which they wish to hear. Facial expression recognition has been an effective method to perform expression analysis. The best way for people to analyse or conclude the emotion, feeling, or thoughts that another person is attempting to show is through their expressions. This system may also be helpful in clinical aid in the recovery from conditions such as depression and sadness. We can take a step to help improve a user's mood and avoid various health risks.

2. LITERATURE

Renuka Londhe [1] proposed a study of changes in the facial curvatures and how intense are the respective pixel features. To classify the emotion, Artificial Neural Networks (ANN) was used here. The author proposed several approaches for playlist creation.

Zheng [5] showcased two major categories for facial feature extraction: based on appearance and based on geometry, which includes extraction of some key features of the face.

Nikhil [9] use facial expressions to determine the user's mindset. Humans frequently express their emotions through facial expressions, hand gestures, and tone of voice, but they mostly express their emotions through their faces. The user's time complexity is reduced by an emotion-based music player. Usually, the playlist of the user has multiple genres of songs and still then it is not able to satisfy the user and uplift their mood. Here, the captured images are converted to binary from RGB format. A java programme was used to create the music player. The database is taken care by it and the songs are played accordingly.

Zeng [5] investigated developments of affect recognition in humans. This paper also gives different computing methods. There are seven categories of emotions upon which the affect is checked. This paper helps in understanding the challenges faces for creating a robust affect recognizer.

Parul [7] proposed an automated interaction system. Where the music system can play according the preference given by user, and their emotions.

Anukriti et al. [6] proposed an algorithm with less computing time and song according to the emotion is played. The idea it to categorise emotions into five different categories. The approach is to have less time in extracting an audio signal.

Aditya [8] created an application that personalises the music system for a user by analysing and presenting songs based on the user's mood. To implement facial recognition algorithms, the application was built with Eclipse and OpenCV. This paper also provided a comparison of various facial feature detection algorithms. It is an android application with

front camera used as the live camera. Its goal was to satisfy music fans by eliciting their emotions.

Methodolgies

We are employing the CNN classifier. Convolutional Neural Network (CNN) is majorly used in CV tools and in classification task. CNN is a powerful algorithm which is used in classification tasks suck as recognition of patterns and also in processing of images. It has many advantages, including an easy and user understandable structure, fewer parameters involved for training, and its highly adaptive nature. BGP (Binary Gradient Patterns) is proposed here, as it is an effective image descriptor. There are some structures in BGP, which extracts gradient patterns in the form of a binary string. This is done to represent its effectiveness in local regions. A set of binary strings are created by computing various image gradients from different directions. This computing is done to find the local structures. Some of the binary strings which are encoded contain meaningful structures which allow high discrimination. The representations of faces in these structural BGP histograms are extremely resistant to various facial image variations, particularly illumination.

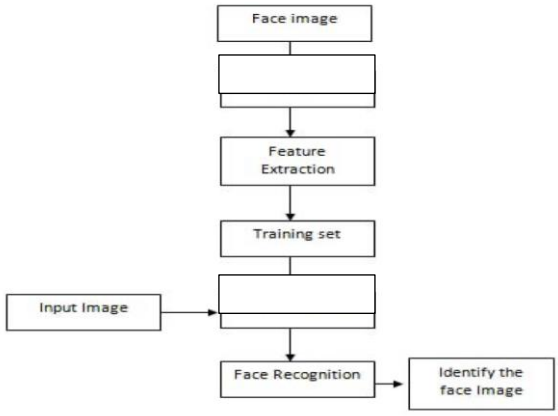


Figure 1: Working of BGP

1. **Emotion:**

A live camera is used for taking a real-time picture of the user. After an image is taken, the captured image is framed with respect to grayscale as it helps in increasing the performance when we are classifying an image. After the conversion to grayscale, the picture is sent for classification. Here, the extraction of features from the image takes place which is useful in detecting emotion. Individual features are extracted from the classified image and is sent to a network which detects the emotion. The introduction of new pictures to the classifier each time is important, in order to make the classifier ready for entirely

unknown image's feature extraction, where it has to work based on the knowledge gain. The network where images are sent for emotion detection are trained with huge data.

2. **Audio***:*

After an emotion is detected by the network, the audios which the user can play from the playlist created for that emotion's genre are displayed. The user has the convenience of playing any song they wish to by shuffling that playlist.

3. Linking Emotion and Audio

Now, the song is played where the emotion which is extracted corresponds to that particular playlist. If the emotion is angry, then a song from the angry database of songs is played for the user.

Proposed Algorithm:

i) The system which we are proposing will work by using an interface which will scan the face of the user through live camera or it can also scan the pre-stored images from the system.

ii) Then the system will filter the images and check for different features and delete the ones which are irrelevant or unwanted.

iii) Now, only the images which have positive value are classified under given parameters.

iv) These parameters are the ones which help in providing a certain collection of genres in songs, and based on this the audio is processed.

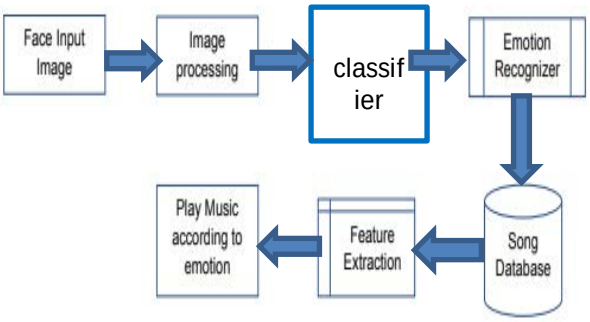
v) Various songs are distributed into different playlists based on its genre. Therefore, a list is created which has songs on similar emotion.

vi) A suitable music system is provided to the user.

vii) This system first detects if there is a presence of any face on camera. If a face is detected, then an emotion is displayed which corresponds with the feature selection performed by the system.

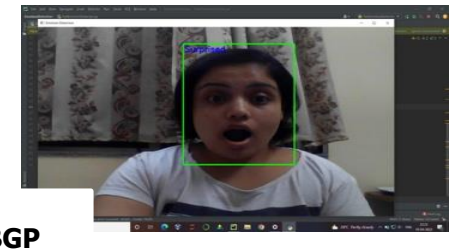
viii) Finally, when the emotion is detected, the screen shuts down the camera and a music from the playlist created starts playing which corresponds with the emotion identified.

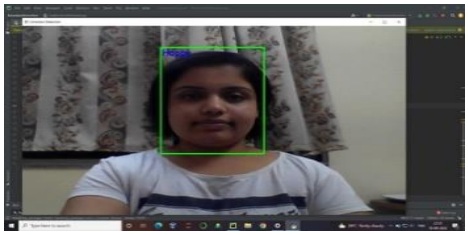
4. Block Diagram



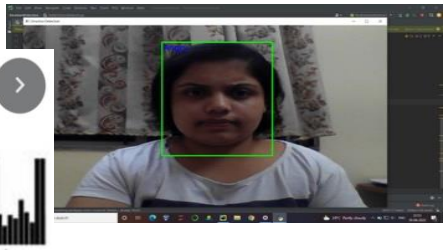
5. EXPECTED RESULT

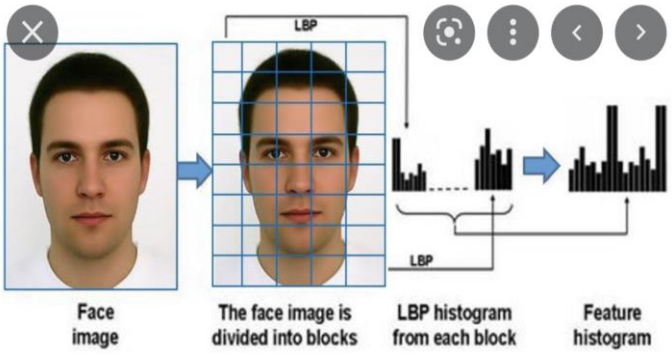
Emotion detection:





BGP





6. CONCLUSION

Our system was able to successfully capture a user's emotion. This predicate in tested in a real time. To determine its robustness, it must be tested in various lighting conditions. This system is also able to seize the user's recent images and update its classifier. It can also

inform the training dataset. This system is designed using the facial landmarks scheme and, is it also tested under numerous conditions to determine its outcome. When tested live on a user, we can see that the classifier is able to predict the user's expression in a real-time environment accurately.

7. APPLICATION

- Health care industry is using this technology where an automated recognition software is helping them assess emotional response of patients in clinical trials.
- Reducing the prevalence of stress-related diseases.
- It can also be used to keep an eye on bedridden elderly people at home. When no one is around, this system can function as an automated system, playing songs based on their mood to keep them engaged.

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Automatic Vehicle Speed Limit Violation Detection and Reporting System By Using Raspberry Pi

Raghavendra Reddy[1], L.Sailender Reddy[2], Mervin John Panicker[3], P S S Chakradhar M[4]

[1]Assistant Professor, School of Computer Science and Engg, REVA University, Bangalore – 560064
[2,3,4] School of Computer Science and Engg, REVA University, Bangalore – 560064
[1]raghavendra.reddy@reva.edu.in
[2,3,4]R18CS486@cit.reva.edu.in, R18CS225@cit.reva.edu.in,R18CS266@cit.reva.edu.in

ABSTRACT

The majority of accidents occur as a result of excessive speeding. Almost everyone wishes to arrive at their destination without any problems. To avoid overspeeding due to negligence. We came up with a solution that could handle a variety of overspeeding issues. The speedometer is used as the primary device to measure speed, with the help of the Raspberry Pi module and speakers. We created a user-friendly website that assists users in changing speech modules (recorded voices that they may keep if desired) and sending notifications to their parents/guardians about the person who is speeding and directing them to the correct path. If the rider goes beyond the threshold 1, it plays the voice message from the speaker, If the rider goes beyond the threshold2 it sends the notification with the location of the vehicle. On the website, users can change voice modules and contact information.

KEYWORDS: Over-speeding, GPS tracking, Speed monitoring, Raspberry Pi, Violation Detection

I. INTRODUCTION

In countries like India, Over speeding is one of the major issues. With the help of the Internet of things, Traffic management can be done efficiently. Exceeding the posted speed limit and driving too fast for the conditions are both considered speeding. Unfortunately, many people do not consider following speed limits to be a critical part of avoiding collisions. Nearly one-third of all fatal crashes are thought to be caused by speeding. Mobility should never come at the expense of safety. Travel that is simple, quick, and relatively inexpensive is crucial for people's jobs and personal lives, and national economic progress.

Speed management (getting road users to a safe speed via an integrated set of measures) must prioritize safety, but governments and people involved in local speed management have issues in balancing mobility and safety. To resolve this problem, we came up with the idea of getting an alert sound. So we used a Raspberry Pi and connect it with an LCD and speaker. As we programmed we will give the limit of speed as per the government instructions. In turn, the Raspberry pi returns an auditory message to the speaker, telling the vehicle to slow down. We choose over the buzzer or beep sound, if the person can hear their loved one voice they can stop themselves from driving fast. We will keep the default voice and the user can change the voices of their loved ones as per convince. As we created the website for changing the voices as per the user's interest so they can get the information.

The user can add the mail ids of their family members and created a notification alert system so the parents or guardians will get the message or alert notification as per [15] when their child goes beyond the limit. The parent will get the location of the rider using a GPS sensor we referred to [10]. This is very useful to parents/guardians as they can monitor the rate of speed they are traveling and their location.

The main contributions of the proposed work are as follows:

- The proposed approach provides a system that tracks the speed and location of the vehicle.
- It plays the voice message when the vehicle exceeds threshold1.
- It alsosends the location of the vehicle when it exceeds the threshold2.

The rest of the paper is organised as follows. Section II examines past research studies that were conducted in order to assess the data and develop the proposed plan Section III goes over the suggested technique in great depth. The results of the recommended method are examined in Section IV. Section V conclusion and future enhancement work.

II. LITERATURE SURVEY

T.Rajeshkumar et. al[1] proposed the system uses an embedded system, which is a special-purpose computer that is contained within the machine it operates. The technology will allow parents to receive a text message on their phone as an alert if their

automobile exceeds a previously defined speed restriction. One of the causes of accidents, particularly at night, is the driver's carelessness. Driver sleepiness is another key factor in automobile collisions. The technology uses an eye blink sensor to monitor the driver's eye blink, and if the driver loses consciousness, an alarm is generated. The proposed approach maincore idea is to avoid teen accidents by sending a text message When the driver becomes tired, the eye blink sensor and message help to send an alarm. This technique will allow you to safely arrive at your destination.

BegümKorunurEngiz, et. al[2] proposed Radar which has sensory components that give it new capabilities. Where it is feasible to view an appropriate set of objects that have been discovered, as well as discover or detect things that are beyond the human eye's ability to see. Night vision, fog, smoke, and other factors do not affect radar. One of the most significant functions of radar is to measure the speed of moving objects, whether they are traveling toward or away from the target. At long distances where seeing is possible within radar range, the radar can exceed regular vision. We chose Raspberry Pi because it can save us if there is no vehicle also.

Table 1. Summary of the various papers studied under the literature survey.

Ref. No	**Methodology**	**Advantages**	**Limitations and Enhancements**
1	Embedded System	Used to send Text messages to parents	Message delayed and not accurate in speed capture
2	ultrasonic radar.	Using sensors it can detect the objects clearly	Cannot keep the device in all places
3	MEMS, RF, GPS, and GSM technology.	Using GPS, it sends the location vehicle	GPS modules were used to get the user's location. This can be expensive as there is a requirement for a separate module in the vehicle
4	GSM modem,GPRS	Using a GSM modem it sends the SMS	The GPS coordinates are sometimes not accurate and SMS will be delayed

D. Narendra Singh et. al[3] suggested So, MEMS, RF, GPS, and GSM technology inform drivers about speed limits in zones and detect crashes automatically. to avoid such mishaps and to notify The highway department has placed signboards in such places to inform drivers about the speed limits. However, it is possible to view such signboards on occasion, and there is a risk of an accident.

Paras Gosa et. al[4] suggested A speed limit violation detection and warning system hardware prototype. The GSM modem will get an SMS cell broadcast message including the speed limit information while entering the cell area. When a user violates the stated speed limit for the third time, the system will issue a fine, as well as the vehicle's GPS coordinates, and will utilize GPRS to update the information about the overspeeding to the user's profile on a cloud website. The system will also send an SMS to the user's registered phone with information about the fine as well as the website address. A cloud-based webpage has been created where the user can pay their fine and view their location. The summary of the Literature Survey is given in table 1.

From the literature survey, we have noticed some limitations in the existing work. Some of the approaches are taking more time to send the message and it is not accurate also. In order to send the SMS it needs a network. The GPS is not enough to get the accurate location of the vehicle. Some of the device cannot keep in all places and it is expensive. The GPS coordinates are sometimes not accurate and SMS will be delayed. In our technique the notification is sent from the website which is acurate.

III. METHODOLOGY

We came up with the notion of making an alarm sound to remedy this problem. As a result, we used a Raspberry Pi and connected it to a monitor and speaker. As programmed, we will set the speed limit per government directives. The Raspberry Pi then sends an aural message to the vehicle's speaker, asking it to slow down.

We like the buzzer or beep sound because if a person can hear their loved one's voice, they will be less likely to speed. The default voice will be retained, and the user will be able to change the voices of their loved ones as desired. We designed a website to change the voices according to the user's interests and to provide them with information.

The user can add the email addresses of their family members to a notification alert system, which will send a message or alert notification to the parents or guardians when their child exceeds the limit. The parent will use the GPS sensor to determine the rider's whereabouts. Parents and guardians will appreciate this because it allows them to keep track of their children's pace and location.

A. Design Objectives

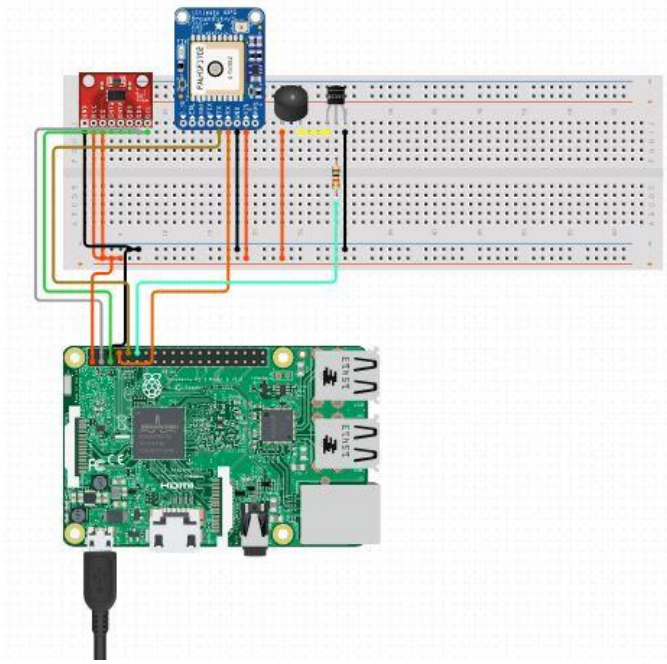
Some of the objectives which we intend to achieve through our proposed work are given below:

- To create a speed warning system that will monitor the vehicle's speed and activate an aural alert as well as record the infringement when the pre-set speed limit is exceeded.
- Using the voice of people is a much more easy way to stop people instead of buzzers**.**
- We want to provide different voice modules for users.
- We are providing multiple contact info on the website.
- It can send the location of the rider.

B. Architecture

The architecture comprises Rasberry pi, GPS sensor, speed sensor, speaker via jumping wires, and the code for the working is written using the python, as mentioned in the pin diagram.

1. GPS:The Global Positioning System (GPS) is a satellite navigation system that uses a radio receiver to gather signals from orbiting satellites to calculate location, speed, and time.
2. Raspberry Pi:The Raspberry Pi is a credit card-sized low-cost computer that connects to a computer display or television and uses a standard keyboard and mouse. It's a powerful little gadget that enables people of all ages to learn about computers and programming languages like Scratch and Python.
3. Jumper cables**:** which used to connect the speed senor and GPS sensor to raspberry pi
4. Speaker: It is used as the output for the voice's
5. Speed senor**:** which is used to measure the vehicle speed.
6. Breadboard **:**(one standard breadboard &Four Mini breadboards)- LEDs are placed on four mini breadboards according to the four-way junction, A standard breadboard is used to connect parts and give some power to multiple parts.



Working on Raspberry pi:

Connect the Speed sensor to Raspberry pi for the speed of the vehicle, and the GPS for the location of the vehicle as shown in fig1.

1. The Raspberry pi checks the speed of the vehicle,
2. According to the project where we have two cases, one is about the notification and the other about the voice and location.
3. If it crosses the threshold1 raspberry pi plays the audio file from the speaker that the user uploaded in the database.
4. If the vehicle goes beyond threshold 2 the raspberry pi sends the signal to a server that intends to go to the website and check the user contact details and sends the notification.
5. At the same time, the raspberry pi sends the location of the vehicle to contacts that the user gives on the website.

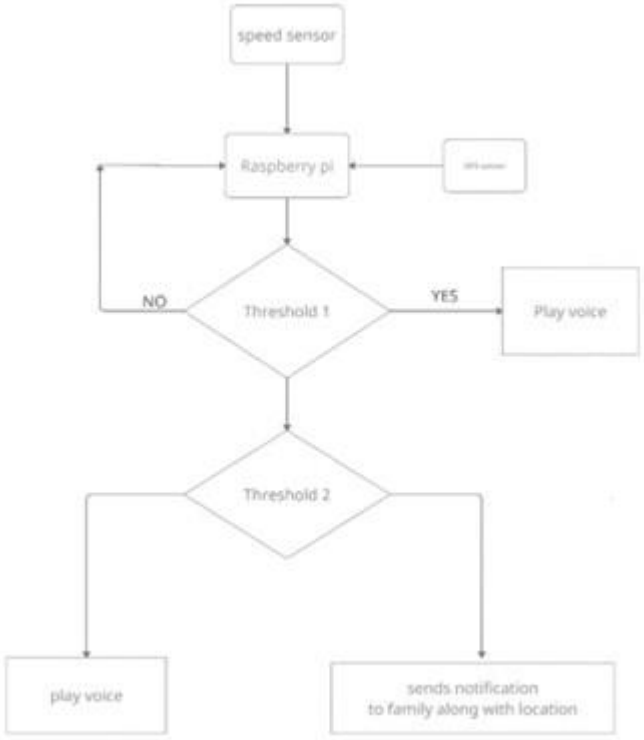


Fig 1illustrates the schematic diagram of the components present in the system.

Working on the website:

1. The website has two main parts .one about adding and updating the family contact details.
2. The other main part about uploading the voices of family, we have given an option to update the voice whenever the user wants to change it.
3. According to the thresholds, the raspberry pi searches the user's contact details and sends the notification, and plays the voice that the user uploaded to the website.
4. With the help of GPS, the raspberry pi sends the location to the contacts along with the notification as shown in fg2.

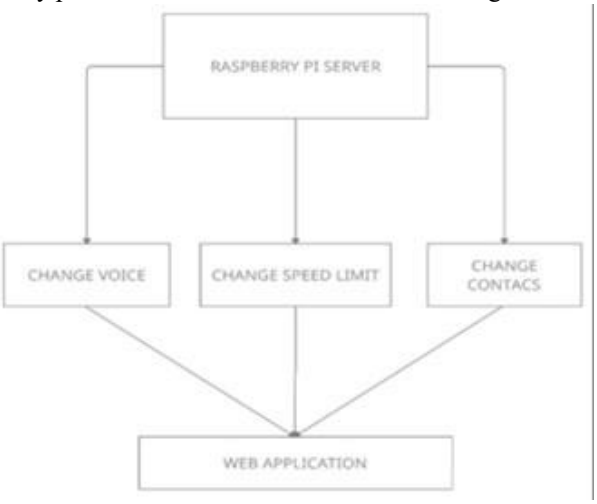


Fig2: shows the working of the website.

Algorithm:

Step 1 The user should add their contact details to the website.

Step 2 The user should upload the voice modules tothe website.

Step 3 The speed sensor calculates the speed of the vehicle.

Step 4 If the vehicle exceeds the threshold1 it plays the voice message.

Step 5 If the vehicle exceeds the threshold2 it plays the voice message and sends the notification to parents with the location.

IV RESULTS

Results obtained after performing the above-mentioned technique can be summarized as follows:

The speed of the vehicle is measured by the speed sensor. When the vehicle exceeds the speed of threshold 1, it connects to the Raspberry Pi server, selects the voice message from the local storage, and plays the voice message. When the vehicle exceeds the speed of threshold 2, it connects to the server, checks the contact details, sends the notification to contacts, and plays the voice message. The parents/guardians will get the notification with the location of the rider. As mentioned in fig3 the user can add or modify the contact details on the website. so when the vehicle exceeds threshold2 the notification will go to parents along with the location of the vehicle as shown in fig4. The user can upload or update the voice modules on the website as shown infig5a&5b.Accuracy comparison between the proposed system and the existing system.

Table 2. Accuracy comparison between the proposed system and the existing system

Author	Methods used	Accuracy(%)
T. Rajeshkumar et al [1]	Embedded system	89
EngizBegümKorunur et al[2]	Ultrasonic radar	88
D. Narendra Singhetal[3]	RF	90
Paras Gossetal[4]	GSM	80
Proposed Method	Raspberry pi,GPS sensor, and speed sensor are integrated into a hardware device.	93

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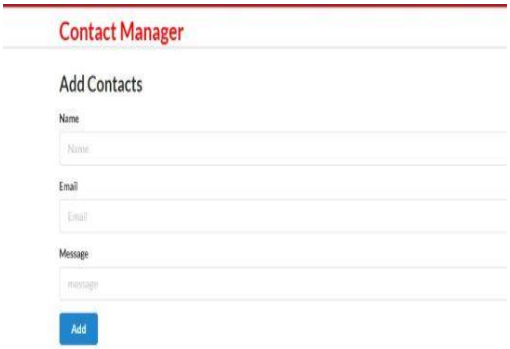

Fig 3 shows how to add the contact details to the website

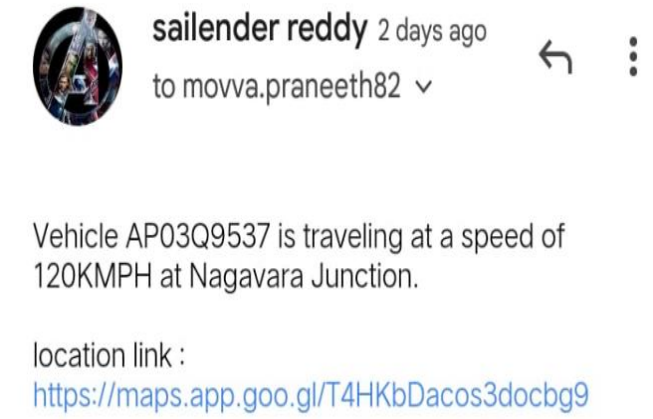

Fig 4. Gives the mail information about the overspeeding and location of the rider.

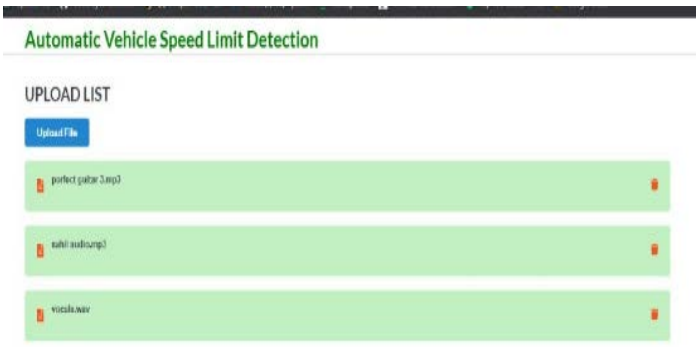

Fig 5a & 5b show how to upload the voice messages on the website

V. CONCLUSION& FUTURE ENHANCEMENT

Developed a vehicle over-speeding model using IoT. This project helps in saving the lives of people. By using our technique or model it tracks the speed of the vehicle and if it is more than the limit then it gives the Voice to reduce the speed. It not only gives you an alarm but also helps save a life.we have brought in an additional feature of Voice Message(while Over speeding).After the literature survey, we have come across the likes and dislikes of the community.vehicles prefer voice messages over sounds of Buzzers.

We also added a website to notify the parents about children'soverspeeding. It can send the location of the vehicle. The user can add or remove the voice modules on the website.For future enhancement, we can use the cloud database for storing the data and voice.

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EFFICIENCY/IMPACT OF CORRECT WORD PREDICTION VS TYPING EFFICIENCY

[1] *Prof. Manju More,* [2] *P Gautam,* [3] *Niranjan Ajgaonkar,* [4] *Samuel Jonathan,* [5] *Madeeha Afreen,*
[1] *Assistant Professor,* [2][3][4] *Student, School of Computer Science and Engineering,* [5] *Electronics and Communication Engineering, Reva University*

Abstract.

Nowadays, AI and ML is the fastest-growing field in computer science. Word prediction software helps in reducing the number of keystrokes, based on context and frequency the next word is predicted. Based on the words previously used by the user, word prediction programs provide the user with a list of likely words. Prediction is necessary to understand the language, these algorithms are specifically used by users who have difficulty in writing due to spelling deficits.
This paper discusses the working application of word prediction algorithms like LSTM, N-gram, BK Trees, and skip-gram; And goes on to compare the efficiency of NLP Word Prediction versus that of traditional typing to establish the better or more efficient way to increase typing efficiency.

INDEX TERMS: LSTM, N-gram, B-K tree, traditional typing technique

1. INTRODUCTION

Interactions between human language and computers, NLP (Natural Language Processing) is a subfield of artificial intelligence, linguistics, and computer science. Used in various applications.

Fig. 1: Where NLP lies

One such example is when a person texts another person, a suggestion bar pops up trying to predict the next likely word that the user might want to use. As shown in fig.1. NLP includes both ML and AI. It mainly deals with the process of prediction. This paper contains a detailed description of the three popular word predicting algorithms:

- Long Short Term Memory Algorithm
- N-Gram Model Algorithm and
- Burkhard Keller Tree Algorithm.

And also,

- A Field Survey;

That proves once and for all, the better of the two: Traditional Typing vs Typing with the use of word suggestions and NLP techniques.

We have used these 3 language models to give readers a better understanding about the logic behind word prediction and sentence automation. The said models are widely used in almost all keyboard applications and mobile phones.

Proceeding this, we have included an interesting experiment on a wide variety of people. The survey inputs data such as, whether people are willing to use automated text submissions provided by their devices, or if they prefer to brute force their way through the construction of words and sentences typing it all without any help. Is it more efficient to use type without using suggestions? What is the future scope for word predicting algorithms in NLP? The result albeit a bit peculiar at first, does hold up upon further inspection.

2. LITERATURE REVIEW

In the comparative study: Andrew Pulver and Siwei Lyu have proposed a much responsive variant of LSTM, that is LSTWM. They have explained the working and architecture of LSTM, and their proposed variant have also been explained. They've compared with their model to that of LSTM. They've concluded with a modified LSTM architecture that outperforms LSTM in several cases. They found an optimal solution for the performance of one of RNN architecture, this could be enriched and used. [1]

Ching Y. Suen has mentioned about the n-gram statistics for Natural Language understanding. He has done the statistical analysis for various combination of letters. And have discussed about the different types of application of n-gram. He found that the n-gram statistics for the application is very useful tool when compared with dictionary method which requires much greater storage and computing time. He concluded that with over the time the machine intelligence in understanding the natural languages and text processing would be closer enough to that of human beings. [2]

3. LSTM (LONG SHORT-TERM MEMORY)

Long short-term memory (LSTM) is an artificial recurrent neural network (RNN) architecture. It is used in the field of deep learning (DL). Unlike the standard feedforward neural networks, LSTM comprises feedback connections. It can process not only one but an entire sequence of data (like videos or long speech). As an example, LSTM applies to tasks

such as speech recognition, unsegmented, handwriting recognition, and abnormal detection in network traffic or intrusion detection systems. [3]
An LSTM network is a type of RNN, it learns dependence on historic data for a sequence prediction task. It's the feedback connections that lets LSTM learn about these historic dependencies. When we speak about a common LSTM cell. We could identify an input gate, a forget gate and an output gate. The flow of information in an LSTM model depends on or is controlled by the weights of these gates. And thus are the parameters that are learned during the training process. [4]
Some variants of LSTM model are Convolution LSTM (CNN – LSTM) and Bidirectional LSTM (Bi – LSTM). For the most part, these variants correspond to different encodings of the input sequence. A CNN- The result of using CNN as the encoding layer has certain cons, that is it needs many parameters, and even bigger model sizes were required. Which isn't fit for quite a few tasks. [4]

i. LSTM architecture:

LSTM deals with both Long-Term and Short-Term Memory. And it makes the calculations very simple and yet effective. [5] When we speak about the Vanishing gradient problem, it is faced when artificial neural network (ANN) is trained with backpropagation and gradient-based erudition. Where at every consecutive iteration while training the neural networks; It is notified which is proportional to the partial derivative of the error function to that of the current weight. [6] And this problem is faced mostly when we go for backpropagation. And Backpropagation is the process where RNN tries to go through the time to backpropagate via the network so that it could adjust its weights in order of error reduction in the network. Here it got the name "though time" because in RNN it would have to deal with the sequential data each and every time when it tries to go back it's equivalent to go back in time to the past. [7] This has a huge effect, and the weight update process is widely affected. Also, the model could turn out to have no purpose. And thus, we use LSTM, which has a hidden state and a memory cell with three known gates. Which is input, output, and forget gate. [8]
As you can see in the fig.2. The LSTM unit is comprising of a memory cell, an output gate, a forget gate, and an input gate. The cell can remember the values within the time intervals and also helps to regulate the flow of information throughout the three gates in the cell. The LSTM's design acquired its current state from the inspiration of the logic gates of the computer. The memory cell has the same shape as the hidden state. And the cell the gates are used. [9]

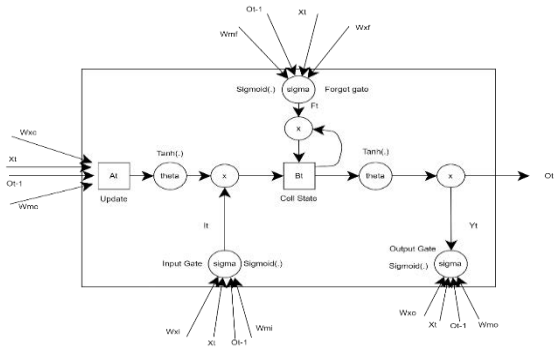

Fig.2: LSTM Unit

a. Forget gate

Forget gate is responsible for LSTM to remember, memorize and recognize all the data arriving in the network and to remove the data or information, which is not necessary for the network to learn the information and forecasts. Forget gate plays an important role in the decision on the passing of data via the layers of the networks. And here the input is of two types that which is expected by the network. One of the inputs requires the data from the previous layers. The other requires the data from the presentation layer. In the fig2, the data passes via the sigmoid function, and there the data has the tendency to fall down to zero and has a probability to be eliminated from the network. [10][11]

b. Input gate

This gate is playing a key role on decision on the importance of data by informing the cell state. As said above the forget gate figures out on eliminating the data from the input gate of the network. This decision is the quantity analysis of the importance of the data which would help the further layers to learn the data for forecasting the moves. Here the data passes via the sigmoid and hyperbolic tan functions. The sigmoid function makes the decision on the weight of data and hyperbolic tan function helps in reduction of the biased networks. [10][11]

c. Output gate

Output gate is the final gate of the circuit. It plays a key role on the decision for finding the following hidden state of the network. From where the data flows via the sigmoid function. Once the cell is updated, the cell state moved to the hyperbolic tan function, it later is multiplied by the sigmoid function of the output gate. This makes it easy for the hidden state to carry forward the data. [10][11]

d. Cell state

The data that is weight gained is calculated by the layer on the cell state when it passes via the cell state. Here the output of both gates, which is input, and output are made to multiply one another. The data that could have dropped out is then multiplied to near-zero values. [10][11]

ii. Mathematical representation.

Let's take that there could be *O* number of hidden units, let the bunch size be m and total number of input number be k. Thereby, the input would be Z_t

$\in \in$

R^{m*k}. And in the preceding time step the hidden state would be O_{t-1}

$\in \in$

R^{m*o}. And here the gates at time step t are put up. Input gate would be X_t

$\in \in$

R^{n*h}, forget gate would be A_t

$\in \in$

R^{n*h}, and output gate would be Y_t

$\in \in$

R^{n*h}. They are furnished into the form shown below. [9]

$$X_t = (Z_t W_{xi} + O_{t-1} W_{ho} + b_i),$$
$$A_t = (Z_t W_{xf} + O_{t-1} W_{hf} + b_f),$$
$$Y_t = (Z_t W_{xy} + O_{t-1} W_{hy} + b_y),$$

Where W_{xi}, W_{xf}, W_{xy}

$\in \in$

R^{k*o} are weight variables or parameters and b_i, b_f, b_y

$\in \in$

R^{1*o} are the biased variables or parameter. [9]

When talk about the memory cell, we could find a method that governs the input and forgetting. The two gates, which is the input gate X_t helps in governing the data that accounts through

$c\tilde{}c\sim$

$_t$ and the forget gate A_t checks the quantity of aged memory contents of the cell C_{t-1}

$\in \in$

R^{m*h} which is retained. And thus, we fall to an updated equation using the pointwise multiplication technique. [9]

$$C_t = A_t \cdot C_{t-1} + X_t \cdot \tilde{c}_t \quad \mathbf{Ct = At \cdot Ct - 1 + Xt \cdot c\sim t}$$

If the forget gate is mostly approximate to 1 and if also the input gate is mostly approximate to 0. Then the aged memory cells would be retained across the time and would be thrown to the current time interval. And hidden state, V_t is computed as the follows, and the interval is (-1,1) [9]

$$V_t = Y_t \cdot \tanh(C_t) \quad \mathbf{Vt = Yt \cdot tan\,hCt}$$

iii.Results

We've defined the model, here the LSTMs hidden state throw back an extra memory cell of the value 0 and the form of the bunch size and the total number of hidden units. [4][9]

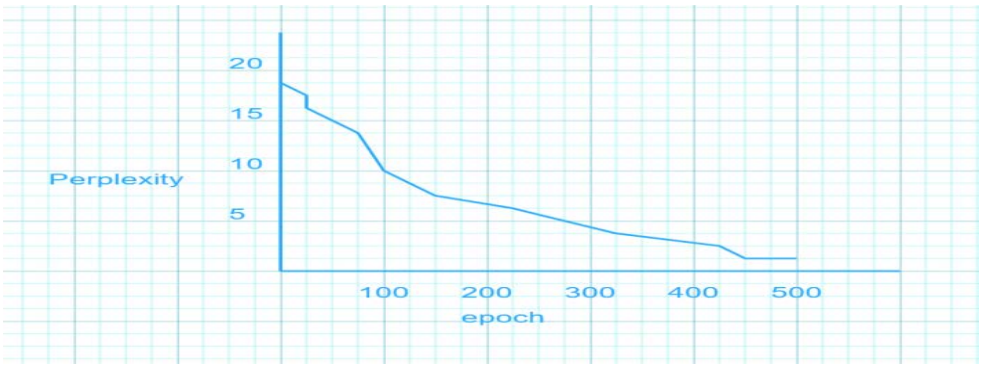

Fig.3: Output Graph of LSTM trained model

As shown in the fig.3 that once the model has been defined by providing all gates along with auxiliary memory cell. The output layer then receives the hidden state. The memory cell C_t has no direct significant role during the output computation. Once We train the LSTM that

is we define the function to train the model in one epoch. An epoch gives out the number of passes is done during the entire dataset training until the ML algorithm is completed.

4. N-GRAM LANGUAGE MODEL

If one has an array of words from a section, or a message that an individual is typing, an N-gram language model comes into play. This model has a specific but arduous task of completing a sentence typed by a user. It is never 100% accurate (unless mindreading was an attribute factored into it), but it still is competent enough to make a calculated prediction. An example of such a unigram set with predictions is – ("My","name","is"," SussySinwin"). Proper nouns are variable to the user.
This model learns the occurrences of selective words in a block of text, and then finds a train to correctly implement the next word as per the calculated probability.
A simple instance:
Let's take up two sentences-
"Career is my focus" and "Career is my thing." Going by a formal and general convention, the N-gram model will choose the former. The latter does not work well in a textual format and hence is omitted by the algorithm.

i. Basic Conventions and Calculations:
A unigram model only checks the incidence of a word. This is the first step towards building the model. The next step is the consideration of the prewritten sentence by the user, specifically known as the bigram model. As one moves forward by considering more words and sentences, the model eventually shapes up to be N-gram
Hence the probability for such a sentence would be calculated in this manner.

M('Entrepreneurship')
M('is '|'Entrepreneurship') P('my '|'Entrepreneurship is')
M('focus '|'Entrepreneurship is my')

This example can be iterated in another technique as well. Most notably, differentiating basic words from their own adjectives or adverbs. The complication of the English language containing multiple dialects is also detected by this model.

ii. Chain rule of probability:
$CR(O_1, O_2, ..., O_n) = CR(O_1|O_2, ..., O_n)\ CR(O_2|O_3, ...,O_n)\ \ CR(O_{n-1}|O_n)\ \ CR(O_n)$
$CR(w1,w2,w3\ldots wn) = \pi CR(wi|w1,w2..wn)$

Simplifying this using a Markov assumption we get 2 formulae for unigram and bigram.
Unigram: - $CR(w1,w2..wn)) = \pi CR(wi)$
Bigram:- $CR(wi|w1,w2..wi-1) = CR(wi|wi-1)$
Evaluation of an N-gram model
Intrinsic evaluation focuses on evaluating independent of the application. This method is a quick and versatile step for algorithm performance check.
To see how efficiently a model designs a prediction(perplexity) a relation is shown
Prob= w1w2..wn, perp (prob)=$CR\ (w1w2..wn)^{-1/N}$
This shows that perplexity is an inverse function of probability
The following graph in fig.4 shows a comparison between various n-grams normalized by words.

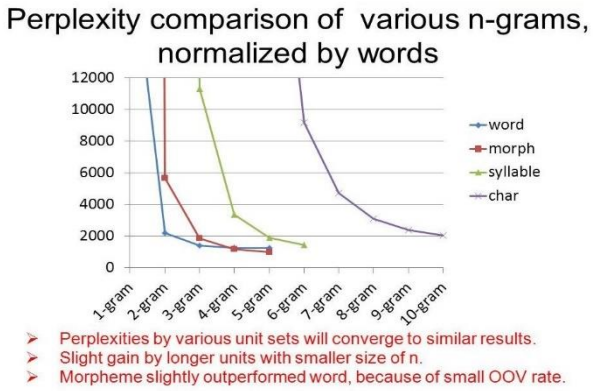

Fig.4 : Comparison of n-grams normalization by words

Perplexity of a set helps us compare various N-gram notations and models.

Language Modelling Metric

Entropy: $H(p)= \Sigma_x p(x).(-\log p(x))$

$H(p)>=0$. There exists a property, which calculates the plausibility of a distribution being accurate, know as cross entropy

This formula is used for calculation of probability of the test set assigned by the language model.

$perp(prob)=n\sqrt{\pi^{N}_{i=1}} 1/CR(wi|wi-1)$

This is a carefully chosen sentence for such a scenario: 'I am a God'. The first word prediction may go down in such a manner :

Word	**M ()**
A	0.4
God	0.3
I	0.12
Am	0.18

Probability of getting 'God' after 'a'

Word	**M ()**
A	0.05
God	0.3
I	0.15
Am	0.5

Probability of getting 'a' after 'am'

Word	**M ()**
A	0.1
Am	0.7
I	0.1
God	0.1

(These probabilities are taken on a curve)
But the general idea pf calculating perplexity remains the same
Hence from this data, we get the perplexity as
MM (W)=2.876 (equivalent)

iii.Inference:

This is a generic mathematical computation that is performed by an N-gram data model. This model needs to be trained on blocks of text/paragraphs for it to function smoothly.

A program (mostly written in python) can perform this task efficiently. But first, it must be trained on a sample. This is the N-gram model might not work as intended. A model that has been trained on the works of medieval poets will not return an accurate prediction if applied to other datasets. Out of vocabulary problems also occur due to this, where a word that does not appear during training appears during the testing.

5. BURKHARD-KELLER TREE:

A Levenshtein Distance is a language metric that is a building block for most algorithms. There exists an algorithm which does exactly that, known as the BK Tree algorithm. This structure is used for appropriate string matching using a dictionary.
This algorithm was adapted to discrete metric spaces (a function that defines a concept of distance between any two members of a set).
Case: **Discrete Metric d(x, y)**. Select an element 'x' as a root node of a tree. This node may have one or more subtrees. The nth subtree is recursively built of all elements 'y' such that d(x, y) = n. [12]
A list of words that need to be verified require a dictionary or a substantial reference point. To achieve this, an accurate reference, possibly a dictionary is used, for string/character matching.
Now if a user typed the word 'ar', the algorithm must then return a dictionary set with words that contain the same/similar letters.
Ex: {air, army}

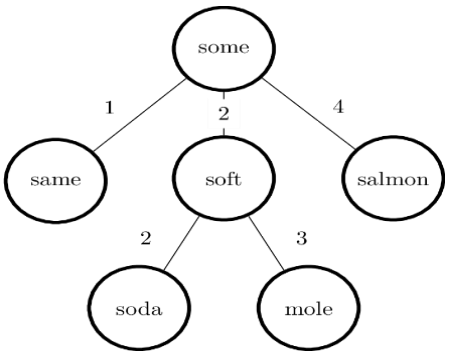

Fig.5 : Example of B-K Tree

As shown in the fig.5. This is a clear example of how BK Tree traverse through nodes of a root words. Every time a new word is added to the dictionary, it sprouts out from a child node of the root node. This child node then ends up becoming a new root node for the sub nodes.

The numbers indicate the number of changes that have been processed on the root word itself. Ex: someàsame has a value of 1, because only one letter has been edited.

A special value has been reserved for checking the number of edits made from the entered word to the theoretically correct word. This approach requires the algorithm to check the whole dataset consisting of all preexisting words, which returns an unnecessarily high complexity. Taking a case where a user has misspelled sola for the same tree.

First checkà. The root node is chosen and then the tolerance is calculated D("sola" -> "some") =4. Each node then branches out to a few child nodes. This child node is then put into the iteration function

Second checkà The second word used in this tree is soft. D("sola"," soft")=4. The tolerance factor is the same as above hence this word is not appended into the dictionary

Third Checkà We have reached the words soda and mole. Here D("sola," soda") =2, and D("sola"," mole") =4. Thus the control shifts to the soda node and attaches that to the dictionary list, i.e {"soda"}. For a bigger tree, with greater specific values the dictionary would expand. Thus, giving a wider range of selection of words. [13]

i.Insertion algorithm in a BK tree

The insertion primitive used to populate a BK tree f according to a metric d

- INPUT:

f: BK Tree;
    d(u,v) for an arc u,v
    w_u word assigned to the node u
d: metric used by f
w: element inserted into f

- OUTPUT:

Node off corresponding to w

- ALGORITHM:

If f is empty:
    Create a root node r in f
    w_r ß w
    return r
Set up to the root of f
While u exists:
    Kßd(w_u, w)
    If k=0:
        Return u
    Find v i.e child of u such that d(u,v)=k
    If v is not found:
        Create the node v
        w_v ß w
        create arc(u,v)
        d(u,v)ßk
        return v
    ußv

ii.Lookup algorithm in a BK tree

- INPUT:

dmax: maximum distance allowed between the best match and w.
(The rest is the same as above)

- OUTPUT:

w_{best}: the closest element to w stored in f according to d or Φ

- ALGORITHM:

If {\displaystyle t}t f is empty:
Return Φ {\displaystyle \perp }
Create {\displaystyle S}S a set of nodes to process and insert the root of {\displaystyle t}t f into {\displaystyle S}S.
{\displaystyle (w_{best},d_{best})\leftarrow (\perp ,d_{max})} (w_{best}, d_{best})ß(Φ,dmax)
While S != Φ {\displaystyle S\neq \emptyset }:
Pop an arbitrary node {\displaystyle u}u from {\displaystyle S}S
{\displaystyle d_{u}\leftarrow d(w,w_{u})}d_u ß d(w, w_u)
If d_u < d_{best} {\displaystyle d_{u}<d_{best}}:
(w_{best}, d_{best})ß(w_u, d_u){\displaystyle (w_{best},d_{best})\leftarrow (w_{u},d_{u})}
For each egress-arc(u,v) {\displaystyle (u,v)}:
If {\displaystyle |d_{uv}-d_{u}|<d_{best}}|d_{uv}-d_u|<d_{best}: (cut-off criterion)
Insert {\displaystyle v}v into {\displaystyle S}S.
Return w_{best} {\displaystyle w_{best}}

The output should be enough to suggest the working of any search algorithm however, to understand the mechanics of BK tree refer the algorithm stated earlier while reading the program (Algorithm)

6. FIELD SURVEY

Word suggestions is a technique to speed up text input by predicting what users are typing before they do, and suggest shortcuts, so they do not have to type the entirety of a word. Word suggestions are widespread they are available on virtually every mobile device but also on laptop computers. Millions of users are daily exposed to word suggestions. Still, we actually know quite little about how they are used, and how they can benefit users. Previous work even showed they can in fact slow down users. But where do we move from here? Does this mean suggestions are not accurate enough? How accurate do they need to be? Does it depend on how fast users can type? To begin with, for example the device they use? In a nutshell, what is the impact of accuracy and typing on the usage and benefits to entry speed of word suggestions?
To answer this, we designed a simple transcription task along with an attached survey. The device used to type was used as a proxy for typing efficiency. The proposed method considers Words Per Minute or WPM as the metric for measuring a person's typing efficiency. The resultant WPM will then be used to compare across different types of devices and depending upon whether or not the participants used the word predictions made available on their devices, we will be able to establish a winner between the two techniques. A sample screenshot of the WPM data collected is available here [15].

Here is what the different conditions looked like

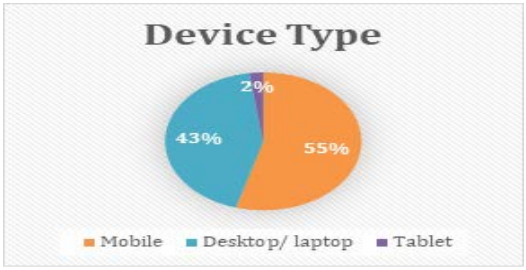

Fig.7: Devices that people used percentage

Out of 50 participants in the survey, roughly 55% were mobile users, 43% were desktop or laptop users and only 2% were tablet users.
Next, we asked our participants how often they used word suggestions available on their devices. fig.8

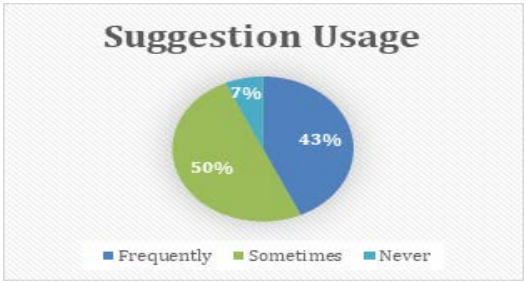

Fig.8: The percentage of how much people used predicted word

We found that 43% of our participants used word suggestions on a regular basis, 50% used this feature sometimes and only 7% never used this feature. After this, participants were asked to complete a 30 second transcription task created on the popular typing website, monkeytype.com, [16] that measured efficiency and accuracy of the users as they keyed in the given word-set.[15]

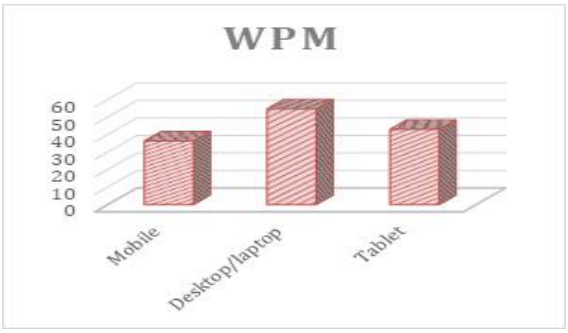

Fig.9: Average typing efficiency of three devices

Among the three device types, you can see in fig.9 that the average typing efficiency among mobile users was found to be 36.33 WPM (Words Per Minute), desktop or laptop users scored 54.68 WPM and tablet users had a score of 43 WPM.

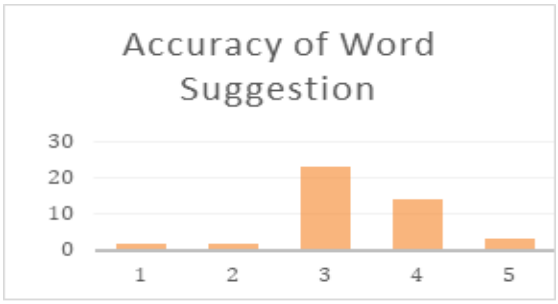

Fig.10: Accuracy of suggested word

We asked our participants how accurate the words were suggested to them, in their daily use. We included two factors, the accuracy of word suggestions, ranging from 1 - upsettingly inaccurate to 5 - uncannily accurate, and the device used to type. It was found that participants did not use much suggestions, except when they were extremely accurate. In fact, virtually no suggestions were used on laptop/ desktop devices.
Lastly, we asked the participants which of the two typing methods they thought was more efficient. fig.11

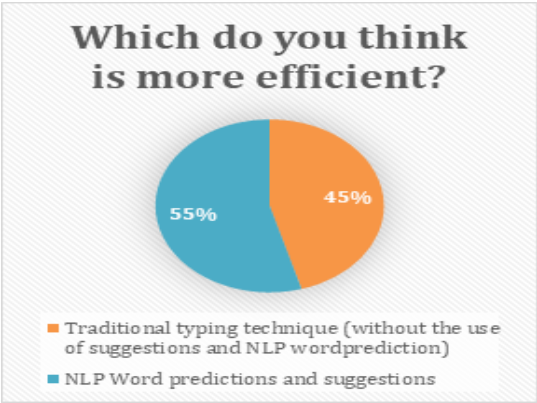

Fig.11: Response of the efficiency between Traditional tying and NLP word prediction

55% said that Word predictions and suggestions are more efficient while 45% said that Traditional typing was the better of the two. In this case the majority were wrong. Comparing the typing efficiency and accuracy of our participants from the transcription task earlier fig.9, we saw that Desktop users, who did not make use of word suggestions were most efficient, compared to the other two types of users.

7. CONCLUSION

To conclude, word suggestions must be uncannily accurate to improve entry speed. How beneficial they are depends upon how fast users can type. If we want to improve entry speed, designing faster typing techniques appears more effective than improving the accuracy of word suggestions. In the present scenario, training humans to type easily beats the efficiency of any word predicting algorithm.
In the future, for an algorithm to compete with the traditional typing technique, its accuracy must be at least 90% consistently, where 90% accuracy feels like the system is reading your mind. This will likely not be accomplished in the immediate future as training an algorithm to read a person's mind with such accuracy will take an indefinite amount of time.

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Lung Disease Detection using Deep Learning

Shiva Kumar R Naik, Sanath Kumar B, Sai Kalyan V, Saladi Satya Sainadh, Sai Sandeep S,
School of Computer Science and Engineering, REVA University

***Abstract*— Nowadays, with the breakdown of covid-19, lung disease was one of the world's leading causes of mortality. As a result, the technological developments and procedures that allow rapid and earlier detection are critical in today's environment. From the beginning to the present, medical professionals have found lung illness analysis and study to be the most fascinating research area. Because detecting of this condition requires effort and screening gear is costly, an automatic detection approach that reduces testing time is needed so that the patient can obtain proper medical care and treatment as soon as needed. To accomplish this task, a model was recommended using CNN that may be utilized to detect lung disease using chest radiographs. The game plan for lung disease identification is to use CNN classification. The suggested model employs the CNN algorithm, which is most often used in deep learning to analyses visual information. During training, the X-Ray picture is smoothed and transmitted to fully connected neural network layers after passing through the Convolution layers. The neural network then predicts and matches the output class to the actual output. The neural network's weights are then modified based on the comparison.**

***Index Terms* — COVID-19, Pneumonia, Deep learning, Lung disease detection, convolutional neural network (CNN)**

I. INTRODUCTION

Lung disorders are the third biggest cause of death today, after ischemic heart disease and stroke. When you breathe, the oxygen in your lungs is distributed throughout your body. The cells in your bodywork and require oxygen to grow. Humans breathe roughly 23,000 times per day on average. Breathing difficulties have been experienced by people with lung diseases. Lung diseases include a variety of pulmonary ailments such as pneumonia and covid-19, as well as lung cancer and other respiratory issues. A novel lung illness, COVID-19 or coronavirus was found in 2019 among all the lung disorders. This disease makes a huge impact on the lungs and respiratory system. The sickness normally takes 14 days to manifest its symptoms. COVID-19 is diagnosed using a procedure that takes 2-4 hours for patients to identify if they have been infected or not.

X-ray scans of the chest can be used to detect a variety of lung illnesses. Since the infected patients, X-ray images must be diagnosed by a radiologist. However, a medical practitioner's
skill is required to detect the condition. As a result, there could be a number of misleading results.

Artificial Intelligence is now widely utilized to examine the RNA structure of various viruses and in research to find treatments and vaccines for them. AI is being used in health care systems in a variety of ways, including disease prediction, patient monitoring, RNA structure analysis, finding novel treatments and

therapies for disease cure, and generating vaccinations for a variety of diseases. Artificial intelligence (AI) approaches can be used to analyze the chest X-rays to create a system. that can detect/classify. The chest X-ray is a determining factor; if the X-ray is normal, patients can return home and await laboratory findings, but if any other test is performed, the results will be delayed, and patients will be anxious until they receive them. This is where the significance of the research we conducted comes into play. As a result, X-rays are useful in the early detection of this condition and can also be used as a screening tool. As a result, AI models that are simple, precise, and faster are helpful in overcoming the problem of disease detection delay and supporting patients in early detection and cure.

Deep learning, which is a model that uses deep (many) layers and requires a long computation time, is one of the most prominent AI techniques. CNNs are a sort of technique which is frequently utilized in pattern recognition (CNN). So in this paper, we use an X-ray image to detect various lung illnesses using a CNN. Large datasets are utilized in the creation of different classifiers. The next part outlines our methodology, which includes a deep learning approach.

II. Objective and Scope

1. Detect COVID-19.
2. Detect “Pneumonia”.
3. Detect "lung opacity”.
4. Detect “normal”.

In order to detect the above we are using X-ray image and we are using Convolutional neural network (CNN) deep learning technique.

III. Literature Review

D. Harshita, M. Krishna Pranthi, M. Reethika at [1] has explained about the new covid-19 is a highly infectious viral infection that has become endemic, posing significant concerns throughout the world. It's critical to identify the cases ahead of time so that we can prevent the pandemic from spreading. However, the main disadvantage is the scarcity of check kits. To overcome this, AI can be helpful or even used in COVID monitoring and detection. This work includes a CheXNet-based version for COVID prediction from chest X-rays. In this proposed version the patients are classified into covid and normal. CheXNet is a Convolutional Neural Network version that was trained on the ChestXray14 dataset to detect anomalies in lungs X-ray. In general, this version became longer to cover all of the points.

The evaluation and observation of lung illnesses is the most exciting research ¼ of caregivers from the beginning to the present day, according to Swati Mukherjee [2] under the supervision of Prof. Bohra. To address this issue, a machine like this can only assist in lowering the percentages of people who are at risk of dying by means of early detection of malignant growth. Multiple systems are offered by and through, although a large number of them are still speculative plans. The overall performance of a neural community model is examined in the resultant philosophy to deal with the problem of recognising malignant cells in

photograph data, which is a common problem in healing imaging applications.

Rajpurkar, P., Irvin, J, Zhu, K, Yang, B., Mehta, H, Duan, T, Ding D., Bagul, A., Langlotz, C, Shpanskaya, K., Lungren, M.P, Ng, at [3] that the experts were able to spot pneumonia via lung X-rays to a level that was superior to that of professional radiologists. To match CheXnet's scores, they use a validation set described by four practicing intellect radiologists. results to that of radiologists. According to our data, CheXNet surpasses the average radiologist on the F1 metric. CheXNet has been enhanced to identify all 14 illnesses in chest X-ray and deliver up-to-date findings for all 14 illnesses.

Mark Sandler, Andre Howard, Menglong Zhu, Andrey Zhmoginov, and Liang at [4] explained that they offer mboxMobileNetV2, a unique mobile structure that increases mobile models' performance in a variety of activities that is cutting-edge of activities and standards, as well as across a range of industries variety sizes of models, in this work. We also present effective strategies for utilizing these mobile models to item identification in a unique architecture we call mboxSSDLite. They also show how to create a mobile segmentation model with Mobile mboxDeepLabv3, a reduced version of mboxDeepLabv3 that is based on shortcut connections between the narrow bottleneck layers of a reverse residual structure. The lightweight expansion layer serves as a bridge between the two expansion layers, depth convolutions to sort features, which cause non-linearity. We also noticed that non-linearity in the thick layers must be lowered in order to maintain presentational power. They show case how this builds performance and describe how this design came to be. Finally, their strategy separates the input and output zone from the change's naturalness, providing a valuable framework for further research.

Muhammad Farooq and Abdul Hafeez at [5] explained that the scientists are exploring a new technique to detect Covid-19's existence and differentiate from other kinds of respiratory disease, such as pneumonia, because to the ease with which it moves accurately and quickly. The goal of this project was to provide an open-source dataset with open access as well as a robust Convolutional Neural Network for distinguishing COVID19 individuals from those other pneumonia infected patients. To construct rapid and flawless neural networks, they apply training approaches such as progressive normalization, irregular learning rate discovery, and astute learning rates.

IV. PROPOSED SYSTEM

A. System Architecture

System architecture is a theoretical design that describes about the structure of the system, function, and other features. An architectural specification is a systematic explanation and system representation arranged in a way that allows analyzing about the system design and behavior.

system components make up system's architecture. To implement the overall system the working of built-in subsystems is needed. Languages for describing of the
system architecture has been attempted to define, and they are collectively known as architecture description languages.

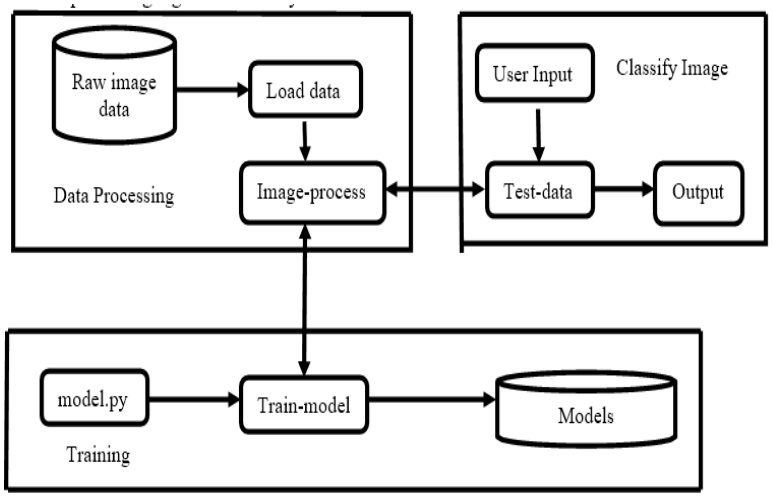

Fig 1. System Architecture

1. *Data Processing*

It comprises of raw X-Ray image files of Covid-19, Pneumonia, and Normal patient in the data processing. Next, we input data to test and train the x-rays before carrying out the process.

2. *Training*

The code for training is in the file model.py, which will then be running with the training model from Python IDLE.

3. *Classify Image*

In this final block the user selects an image which should be tested, and the model analyzes the input image using its deep CNN technique before showing it as Covid-19, Pneumonia, lung opacity, or Normal.

B.Use Case Model

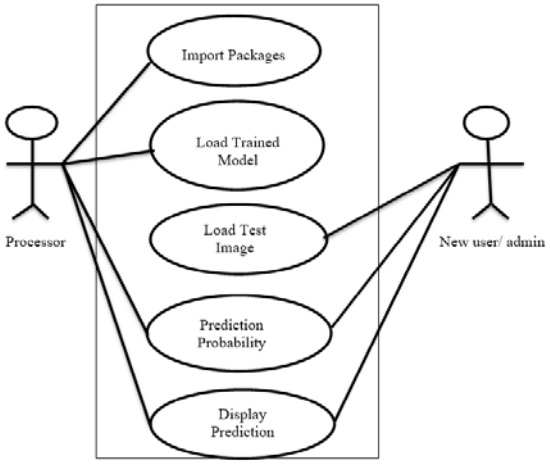

Fig 2. Use Case model of disease detection.

Model flow:

- ✓ The preprocessor must import packages into the model.
- ✓ The preprocessor must load the trained the model.
- ✓ The user loads the test image into the model.
- ✓ The model should have high prediction probability.
- ✓ The model will predict the final output based on user's input.

C.Sequence Diagram

It illustrates interactions in a logical order. It covers the entities present in the scheme as well as the data switch sequence among the entities required to carry out with thefunctions for that particular scenario.

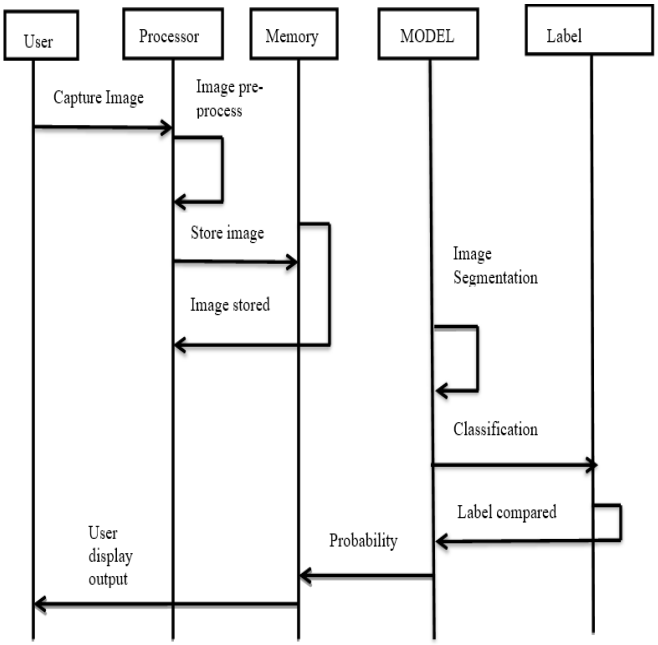

Fig 3. S Sequence diagram of disease detection.

Steps:

- Image segmentation is performed within the model, and the images are categorized as Covid-19, Normal, or Pneumonia, with the probabilities kept in the memory.
- When the image is captured by the user it is sent to a processor where the image pre-processing takes place where images are converted into the same width and height and is stored in the memory and when the user captures the image the prediction is displayed.

D.Class Diagram

It is a form of fixed structural figure that depicts the structure of a system by displaying the classes, properties, actions, and inter-object connections between the entities.

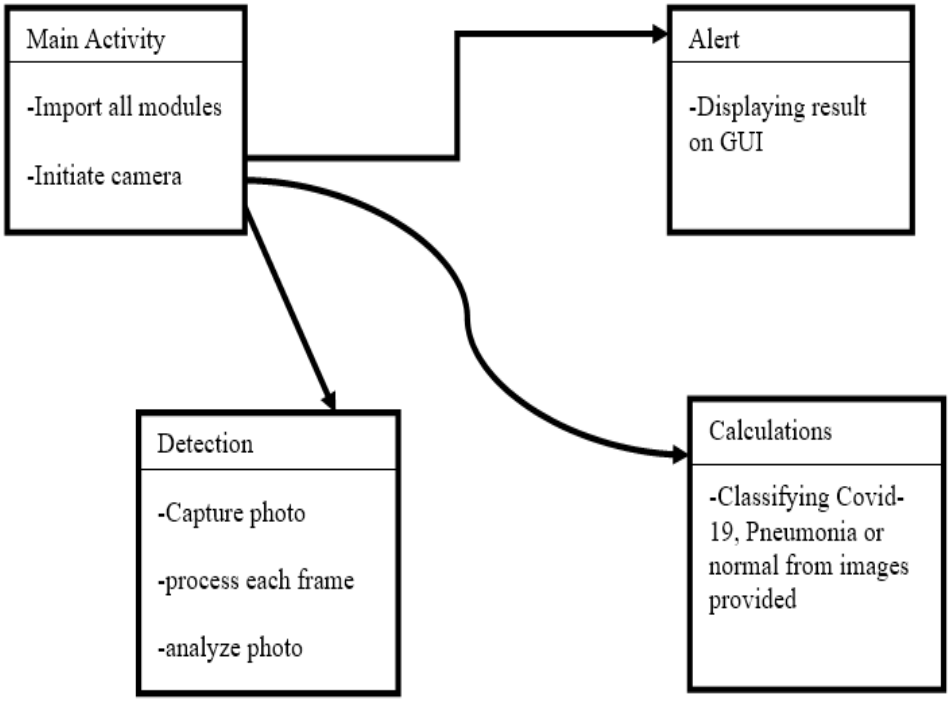

Figure 4. Class diagram of Disease detection

V. ALGORITHM

To categories lung related disease from the dataset, we will design a deep learning system. An X-ray image is fed into the system. It categorizes this data into one of several categories(normal, coivd19 and pneumonia). The system contains a collection of CNNs, image training processes, and neural networks that merge the CNNs' image options with the image. Unweighted averaging is employed to mix the NNs' outputs into a collection of prediction possibilities for the categories. The classification relies on the most probability.The image is provided as input is sent through a sequence of image feature detectors.

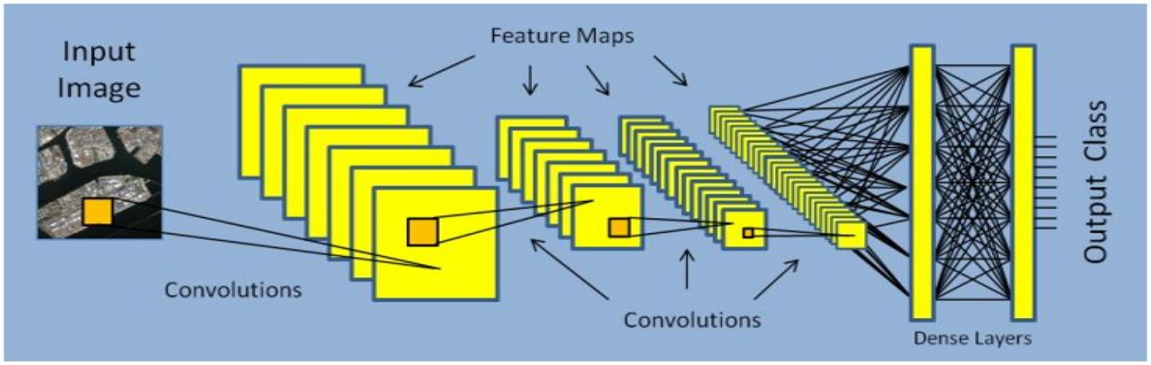

Fig 5. convolutional neural network's structure (CNN)

1. Convolutional Layer

Using feature detectors/kernels, we extract distinct features pixel by pixel in the convolution layer. Convert the source through a succession of convolutions, each with a particular filter. As a result, various feature maps appear. After that, all of the feature maps are combined to create the final output of the convolution layer.

2. Pooling

This cuts down on time required for training and eliminates the issue of overfitting. Max Pooling is a technique for extracting the maximum pixel value from a feature that needs to be extracted.

3. Flattening

The pooled features are arranged into one column as just an input for the following layer that is converting our 3D data into 1D during flattening.

4. Fully Connected Layer

Every neuron in one layer is coupled to every neuron in another layer in fully connected layers. It's equivalent to a multilayer perceptron. This layer applies weights to the data from the previous analysis stage to anticipate the proper label. As a result, the ultimate categorization decision is made.

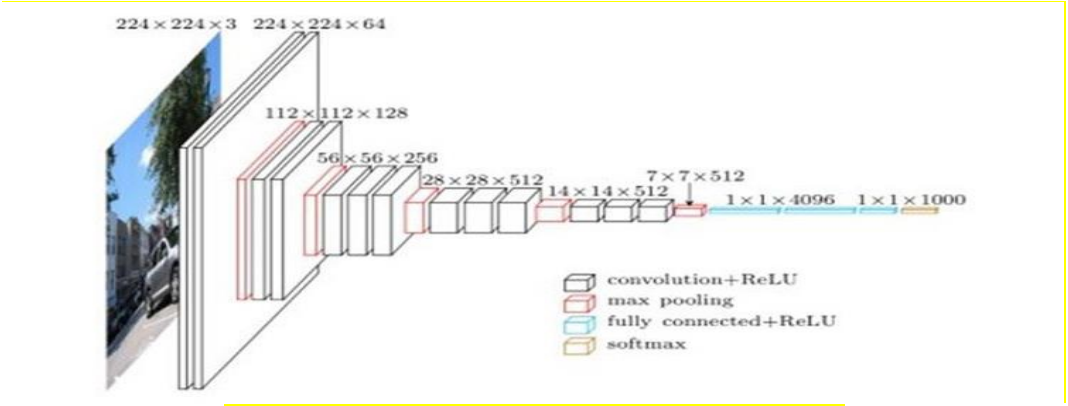

Fig 6 A visualization of the VGG architecture

Every level in CNN uses matrices-based filters that are set to random values at the start. While training, this technique will automatically gain a sense for all these filters. Our CNN will study to categorize x-ray data by: Our CNN will study to categorize x-ray data by:

recognizing edges in the initial layer.

• finding forms in the subsequent levels.

• detecting additional higher characteristics thereafter.

The final layer of CNN makes predictions about the image based on the features from the previous layer. This technique, is indeed an aspect linear combination of 2 matrice preceded by the add up value.

1. Take 2 identically sized matrices.
2. Multiply each ingredient separately.
3. Add up all of the elements.

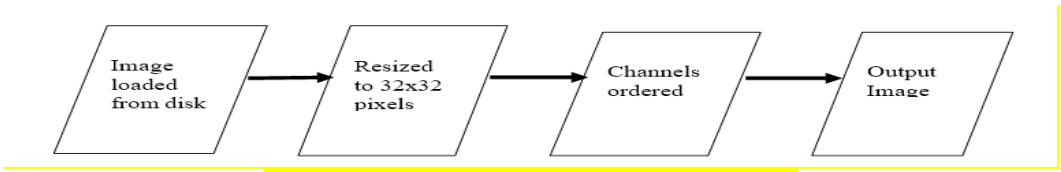

Fig 7 Pipeline for image pre-processing

An image is loaded from the disk. The image is resized to 32x32 pixels and channel dimensions are ordered finally, the final image is the output.

VI. RESULTS AND DISCUSSION

Fig 8. Initial window

The first interface pops up when we run the application. The 1st button, choose image, which is being used to pick a x-ray, while the second button, quit, is used to exit the interface.

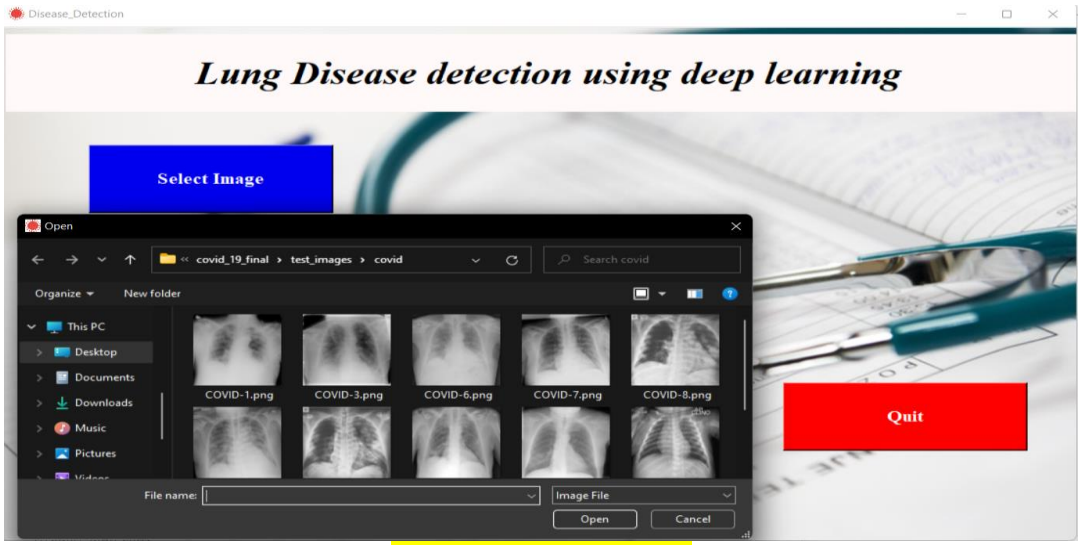

Fig 9. Image Selection

When the user selects the picture button on the selection interface, the photograph file appears, where the person can choose the image from which the outcome should be determined. The user selects the predict button after selecting the image which resulting in Covid-19 Positive, Pneumonia, lung opacity or Normal for the given X-ray.

Fig 10. Covid Resulted

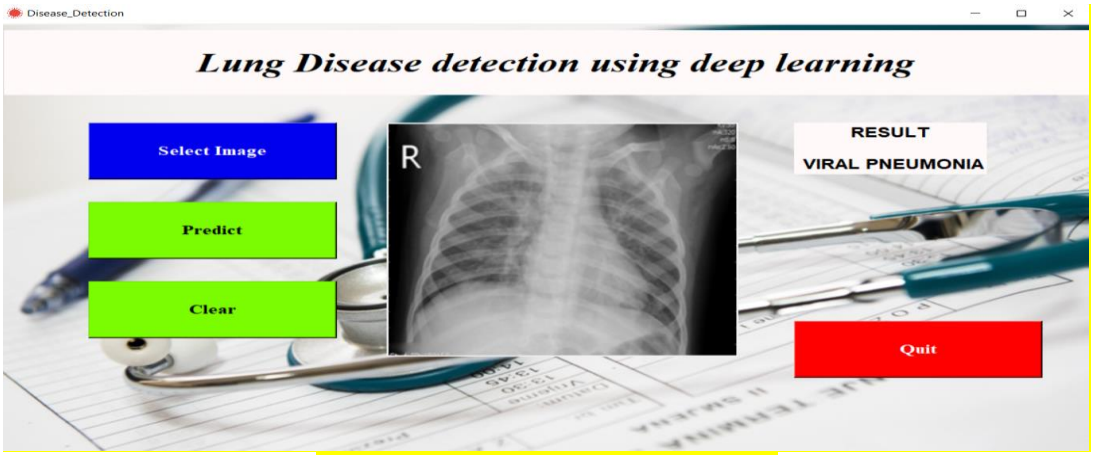

Fig 11. Viral Pneumonia Resulted

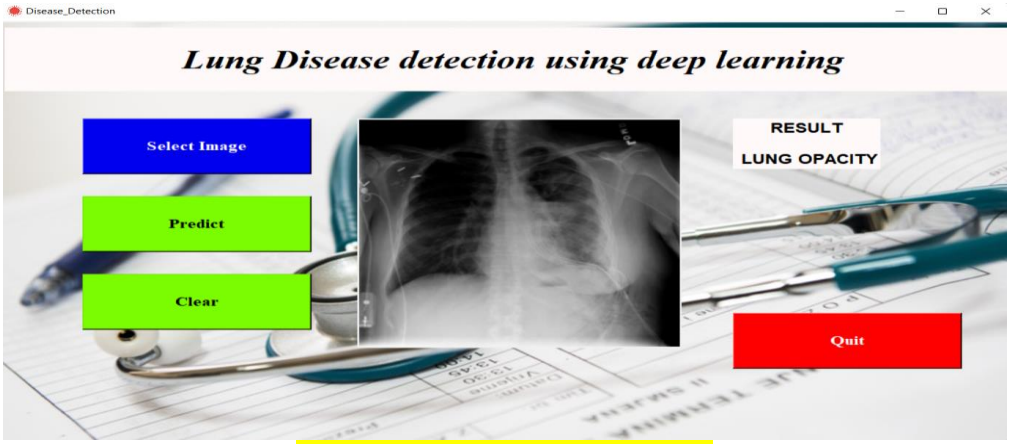

Fig 12. Lung Opacity Resulted

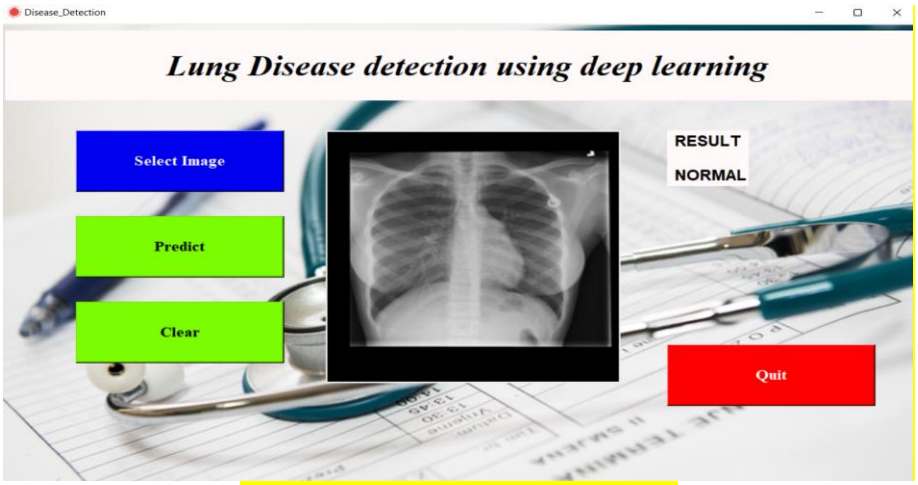

Fig 12. Healthy Person Resulted

This study shows how multiple training strategies may be used to create computationally efficient models. Training and testing with a larger dataset are required to make lung disease detection clinically relevant.

Cost of X-ray and the radiation emitted by X-ray is less which will not harm body or internal organ of a patient when is exposed to X-ray. Using chest radiographs, the recommended model may be utilized to detect lung disease. Because X-ray radiographs are easily available for illness diagnosis, they are recommended. Within seconds, the model can diagnose disease. It is suggested that X-ray images be used with a deep learning algorithm. When compared to CT, X-ray is more accessible due to its lower radiation dosage. Patients who have been identified as by lung disease by the model are referred to radical centers for validation and therapy as soon as possible.

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Blind Aid Stick

Sowmya Sree Kolusu
M.Tech in Computer Science &Engineering
Reva University, Bangalore
Sowmyasree1981@gmail.com

Dr . Sanju . V
Professor, School Of Computer Science & Engineering
Reva University, Bangalore
Sanju.v@reva.edu.in

***Abstract*— There are millions of blind persons in the globe who are in constant need of assistance. It is difficult for these visually challenged folks to travel outside their homes on their own. The Smart Blind Stick that we will build provides a better and more convenient way of life for blind people by allowing them to move around independently. Ultrasonic sensors, a water sensor, and a panic button are all included in the stick. This device can identify impediments up to 400 cm in front of the users using an ultrasonic sensor which transmits a cycle of wave burst in time period of 10ms. We employ image processing techniques to recognize the sign board placed on the road to optimize the projects. The traffic sign recognition from captured/input passed photos is determined by the CNN algorithm running in the PC for proof of concept. The image captured by the camera/loaded image will be captioned and provided to the user as an audio format using pyttsx3 engine. This audio will explain what the image is and what should be done, effectively acting as a virtual eye for the blind.**

I. AIM

Blind individuals experience a ton of difficulty collaborating with their environmental factors. Our primary objective is to establish a climate that will help blind people in exploring, distinguishing hindrances, and getting crisis alarms for their benefit. We have chosen to help them with our undertaking,, which is a hybrid of IoT and App Integration. For improved walking comfort, we've also integrated traffic/road sign recognition utilizing image processing.

II. INTRODUCTION

There are a number of challenges that humans have no control over. Blindness is an example of such a problem. The main goal of working on this project is to bring attention to the world's blind population and to provide them with technical assistance in all aspects of their lives. This condition causes blind persons a great deal of difficulty in doing their daily tasks. One of their most pressing issues is transportation, such as crossing roads, commuting by rail, or visiting other public locations. They also have difficulty identifying obstructions in front of them while walking down.

the street, which makes it risky. They constantly require humanitarian aid to complete the task. However, there are situations when individuals are helpless due to a lack of suchaid. Their reliance erodes their self-assurance.

The shrewd stick is a proposed approach for permitting them to perceive their general surroundings. We recommend an answer as a brilliant stick with minimal expense, quick reaction,low power consumption, lightweight, and foldability in this study. It has an ultrasonic sensor that detects obstructions in front of the user, a water sensor that detects water, oil, or a slippery surface, help buttons in case of an emergency, and alocation sender.

In a variety of ways, an onboard computer vision system that can detect and recognize traffic signals could assist the driver in avoiding accidents. On-board vision technology could enhance reality by displaying upcoming warning signals in advance or even keeping them displayed on a screen after the sign has passed. This reduces the likelihood of the individual missing a crucial sign.se components, incorporating the applicable criteria that follow. The objective of this task thought is to make blind individuals' lives more straightforward on the grounds that they experience a few snags in their regular routines, like while voyaging or directing any movement.

III. LITERATURE SURVEY

1. Image Processing and Embedded System for Blind Navigation Sacinah Jamaluddin and Zul Azizi Hailani are the authors. Description: This paperinspired us to create a navigation system that aidsin the mobility of blind people. This paper suggeststhat we capture a live video of that individual and seize the video feed in front of a blind person and that this live video may be viewed by the admin.[1]
2. Smart Cane: Visually Impaired People's Assistive Stick AmirulATalib and MohdHelmy Wahab are the creators. Depiction We got the idea for Voice message and Vibration from this paper. When a individual identifies an obstacle with the utilization of a brilliant stick, the visually impaired individual becomes mindful of it by deciphering the Vibration alert and that's what voice message shows up from the cell phone. [2]

Electronic Path Guidance for Visually Impaired People AuthorName-IwanUlrich and Johann Borenstein Explanation-We gained from this Paper instructions to decide the reach essential for distinguishing a hindrance or thing from the area of a savvy stick. We want to characterize a limit esteem, and if the hindrance falls inside that reach, it could be recognized effectively; any other way, it can't. [3]

3. Development of an Electronic Travel Aid Using Ultrasonic Sensors by AlexHarold and Chris Gearhartare the authors. Illustration- From this article, we learned that to capture video images, some processing is necessary. Using

some algorithms and methods, we do various operations on the picture to capture it. Live surveillance of the individual may also be observed on the admin side. All processing data is saved in a serialised manner on the server. [4]

4. A Blind or Partially Sighted Person's Automated Mobility and Orientation System Abdel Ilah Nour Alshbatat is the author. Description- We learned about GSM, GPS, and sensors such as integrated ultrasonic sensors, accelerometer sensors, and infrared sensors from this study. Which one is more appropriate, and how do they perform and identify obstacles? [5]
5. Sung Jae Kang, et al., "Development of an Intelligent Guide-Stick for the Blind," produced a sensor-based circuitry consisting of Ultrasonic Sensor and DC motors for detecting obstacles; nevertheless, the gadget weighs 4.0 kg and may be inconvenient for users. This is a significant drawback.[6]
6. They proposed a solution for blind individuals in this research by incorporating an ultrasonic sensor into a blind stick. The gadget is used to detect impediments within a four-meter range, while the infrared instrument is used to detect nearer issues in front of blind individuals. As a result, the radio frequency transmitter and receiver assist the user in locating the smart stick using the buzzer. When an obstruction is detected, the vibration motor in the smart stick is triggered and creates a vibration.

IV. EXISTING SYSTEM

There was a created system for a blind smart stick that uses infrared (IR) sensors to provide early notice of an impediment. The stick vibrates to inform the visually impaired people after recognizing the obstructions. The smart stick, on the other hand, is designed solely for obstacle detection and does not assist the blind in emergency situations. Furthermore, the infrared sensors are ineffective because they can only identify the closest impediment in a limited distance.

V. PROBLEM STATEMENT

It is quite easy for people like us who are healthy to find, watch, and go to their destination, but it is extremely difficult for blind people to do so. They are continuously looking for someone to assist them in getting to their destination. Using Blind Stick, they will be able to solve their difficulty.

It is very simple for healthy people like us to locate, observe, and get to our destination, but it is incredibly difficult for blind people to do so. They are always on the lookout for someone to help them get to their objective. They will be able to fix their problem by using Blind Stick

I. PROPOSED SYSTEM

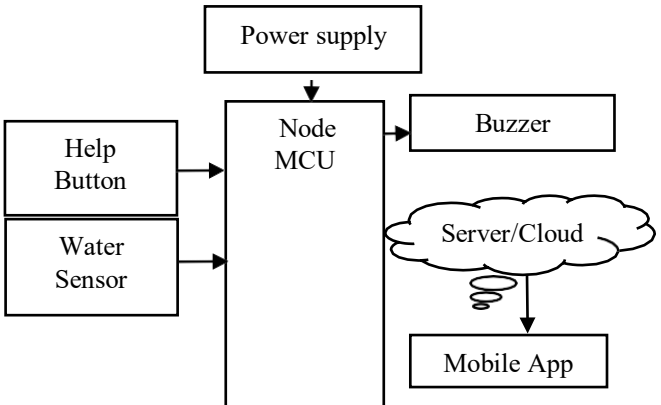
The Blind Stick is a special navigational guide made for outwardly debilitated people. We offer a redesigned blind stick that permits outwardly debilitated people to explore using current innovations easily. The visually impaired stick has an ultrasonic sensor, a buzzer, a water sensor to detect a water log on the road, and an emergency switch. The ultrasonic sensors in our suggested technology are used to identifyimpediments ahead utilising ultrasonic waves. When the sensor detects obstructions, it sends the information to the microcontroller. The information is then handled by the microcontroller, which decides whether the obstruction is close enough. In the event that the hindrance isn't sufficiently close, the circuit has no impact. Assuming the obstacle is in nearness, the microcontroller conveys a message to the ringer to sound.. In any case, by building knowledge instruments on the highest point of the equipment, exploiting conceivable existing sensors also, the presence of an organization of installed units, one can both ideally oversee accessible assets at the unit and network levels as well as give expanded functionalities , far past those accessible. By building insight systems on top of the equipment, exploiting conceivable existing sensors and the presence of an organization of implanted units, one can both advance accessible assets at the unit and organization levels, as well as give increased usefulness a long ways past what is right now accessible.

II. OBJECTIVE

The framework's significant objective is to give a compelling route instrument for blind individuals that gives them a vibe of vision by giving data about their current circumstance and objects.. This system also has an SOS and an alerting system. Because the smart walking stick is abasic and purely mechanical gadget for detecting ground obstructions. This device is compact and lightweight. It gives the greatest travel assistance to the individual. The visually impaired individual can move between various locations without the help of others. The goal of this project idea is to make blind people's lives easier because they experience several obstacles in theirdaily lives, such as when traveling or conducting any activity.

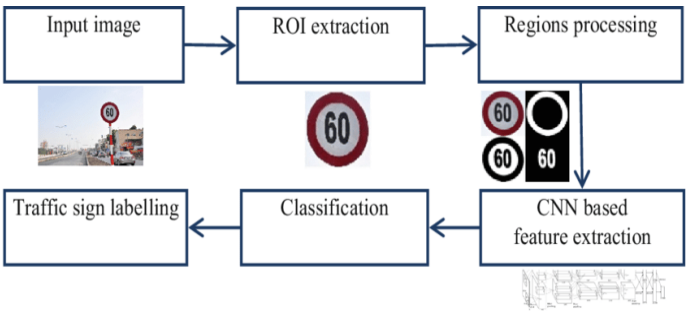
To make it easier for the person, we have also added traffic sign detections using computer vision, which helps the blindperson to automatically identify the traffic signs while walking on the road

VI. METHODOLOGY



The main object of this project is to come up with an idea tohelp blind and visually impaired society people. Using blind stick the blind person can walk independently on his ownand stick will assist the person to navigate. People with visual disabilities often depend on external assistance fortheir help like humans, trained dogs, or some kind of electronic device as their support systems. We accomplishedthis goal by adding buzzer, Water sensor and ultrasonicsensors which will help the user to overcome this difficulty. The working behind blind stick is that it is utilized for some unique purposes like detecting gadget for blind individual. The circuit gives 5V of force supply and keeps up with its result at the steady level. It is utilized to identify object utilizing Ultrasonic sensors and surface ground water using water sensor. If any object is sensed near the person, the ultrasonicsensors will sense it and will send the data to the NodeMCUand buzzer will turn ON, water sensor is utilized to recognize the water present on the ground while walking.
There is a help button provided on the stick in case ofemergency, if the blind person is in trouble, as soon as he presses the button an notification is send to the guardian indicating that the person needs help.

IMAGE PROCESSING PART



We hope that through working on this project, we will be able to comprehend the challenges that computer models.

confront and devise a solution to improve the accuracy and clarity of image classification, which will help us understand the many concepts of Machine Learning and Image Processing. Creating a graphical user interface (GUI) to test the model with multiple traffic sign images
For the blind person's safety, a traffic sign detection and recognition (TSDR) system has been introduced. A TSDR system detects and recognizes traffic signs in photos acquired by cameras or imaging sensors, displaying to the user the traffic laws that apply to that stretch of road. In bad traffic, a person may fail to observe traffic signs, resulting inan accident.
The objective of traffic sign recognition is to track down the areas of interest (ROI) where a traffic sign is probably going to be present. To gain the principal sign, you'll have to edit the additional room, you'll need to crop the extra space. ROI stands for Return on Investment. ROI determines the location of the traffic sign based on its shape, dimensions, and other factors. The traffic signs have been clipped, which is advantageous. The background image has been deleted because it isn't relevant. As a result, we assumethat a considerable portion of the image can be dismissed as unnecessary. The color and shape of traffic signs are predetermined, making them easier to distinguish and recognize.

Classification

The sign is classed in this section depending on the kind, shape, and color of the sign, as well as the information it provides. Elements of a histogram of arranged angles (Hoard): HOG separates a picture into little squares cells,works out a histogram of arranged angles in every cell, standardizes the result with a square wise example, and returns a descriptor for every cell.

VII. SYSTEM REQUIREMENT

- **SOFTWARE REQUIREMENT**
  - Arduino IDE
  - Python IDLE
  - Blynk

- **HARDWARE USED**
  - ESP controller(NodeMCU)
  - Ultrasonic sensor

- Water sensor
- Panic button

Power supply

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7.

Sign Language Detection Using Action Recognition

[1]Vikas G N, [2]Guruprasad V, [3]Siddharth Bavale, [4]Gagan K B, [5]Nikhil S Tengli

[12345]School of Computer Science and Engineering

REVA University, Bangalore, Karnataka, India

[1]vikasgn2@gmail.com,[2]guruprasadv22@gmail.com

[3]sid19sep@gmail.com,[4]kbgagan@gmail.com,[5]nikhil.tengli@reva.edu.in

Abstract

Sign language is a visual language that is used to communicate through hand gestures, hand shape changes, and track information. This is the primary means of communication for the hearing impaired. Despite the fact that action identification in videos has been extensively researched, many algorithms fail to detect actions in real time[3]. Many new methods for dealing with difficult video sequences enhance accuracy and resilience. Recent advances in the application of deep learning to natural language processing and machine translation have left hearing-impaired people, who are part of the population, behind [2]. Here we implement a system which allows this segment of people benefit from these improvements. Transfer learning is employed in our system to speed up the learning process and improve results.

Keywords: Action Recognition, Sign Language

1. INTRODUCTION

ASL and BSL are the world's most widely used sign languages. In the United States, UK and Canada, about 650,000 people use it. We combine ASL and action recognition to analyze the actions performed by humans and respond accordingly. Analysis of video footage is a very expensive task and even the most top of the line machines with very good specifications sometimes have trouble running these tasks [6]. In recent years, deep learning methods have displayed promising results after learning from data obtained by the device.

This concept can be repurposed and used in a lot of different applications. The project done here is using it to detect sign language and make the system respond to the sign language performed by the user accordingly. The software detects sign language in real time . A model is generated based on this for use.

The model helps muted people to communicate with normal people and express themselves. It becomes a lot easier for the normal people to understand muted people.

The feature detection is completed using various contour analysis and have extractions. Thus in the end a tool which can recognize sign language and its other variations.

2. RELATED WORKS

Many approaches and methods have been proposed for Action Recognition. This section enlists the efforts made in the prior:

1. In research paper [1] the authors train neural networks for image classification. Complex images are also trained with MNIST models. This lead to the development of Recurrent Neural Network for the images used. The classification improved to such an extent that even the human eye could not differentiate the classification of the images.

2. In research paper [2] For training, a balanced amount of face and non-facial images are employed. Using a bi-scale CNN 120 that has been auto-stage trained and developed imagenet classification with the help of Binary Convolutional Neural Network. This resulted in a state of art 80% detection rate with just about 50 false positives.

3.In research paper [3] Under each Hierarchical classifier, there are several datasets. Rejection of the class based on the intermediary stage was performed by the authors. The survey done by the authors considered classification techniques such as Decision Tree (DT), Support Vector Machine (SVM), and Fuzzy Classification under the artificial neural networks.

4. In research paper [4] Spectral information is combined with spatial information from a sequential trial method. This lead to SVM Active Learning Approach for Image Classification Using Spatial Information. The results obtained by the authors in this research paper demonstrate the efficacy of regularization in the spatial domain for active learning purposes.

5. In research paper [5] Simply increasing Meta knowledge where local characteristics can be mostly found. This approach followed by the authors gives better classification accuracy. This paved the way to a reduction in the time required for learning and testing process by around more than 30%.

3. OBJECTIVES

The goal is to develop an application which utilizes video groupings for continuous gesture based communication. To foster an application which utilizes activity acknowledgment as a standard. To fabricate a compelling gesture based communication model. To plan an application which utilizations Action Detection. Activity discovery should be fueled by LSTM (Long Short Term Memory Network) layers to construct the model.

4. SYSTEM REQUIREMENTS

CPU : Intel i5 and Ryzen 1st gen +

HDD : Min of 10gb

HD Webcam

OS: Min Win 7 and Above, Linux or MacOS

Python : 3.3 and above

Tensorflow JS, React JS

5. METHODOLOGY

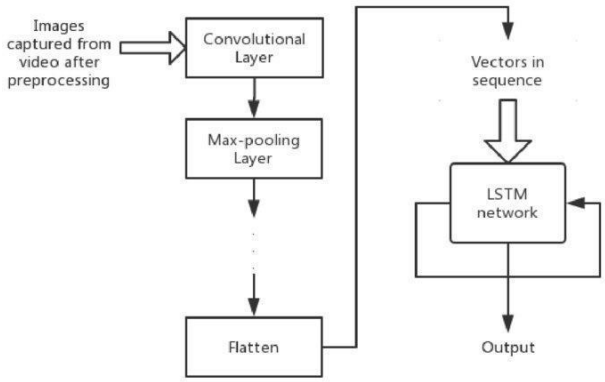

Fig. 1. LSTM model workflow

Live video feed is obtained from the system camera using OpenCV. Keypoints are extracted using MP holistics. Training and testing of data is then performed. Preprocessed data is used to create Labels and Features. Later a deep learning model is Build and Train. Predictions and evaluations are made with the help of Confusion Matrix and Accuracy metrics.

The option to use a keypoint extraction to assemble an arrangement of keypoints with the use of numpy which can then be passed to an activity identification model to perform communication is made possible with the help of OpenCV. As a component of the model creation process the option to use Tensorflow and Keras to construct a Neural network that use LSTM layers to deal with the arrangement of keypoints is performed.

Testing is done to find and rectify errors. In case of poor accuracy the model can be retrained by specifying the appropriate number of epochs. Finally deployment of the model is performed.

6. RESULTS

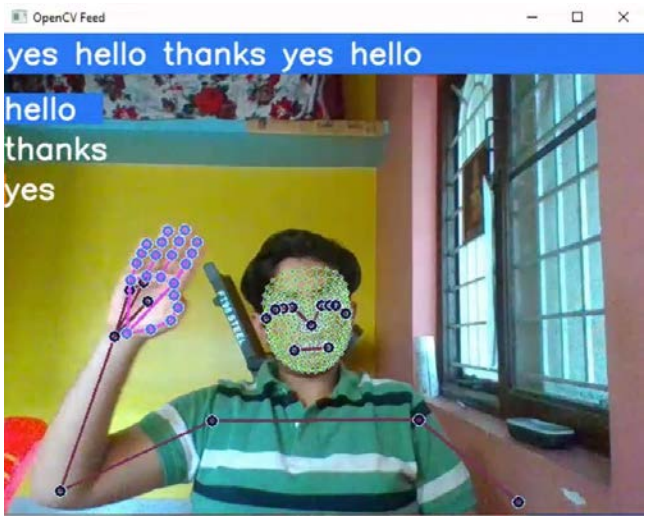

Fig. 2. Action recognition with MediaPipe

In the given image above labeled as **Fig 2** we take 30 video frames to detect a single action performed by the user, thus ensuring higher precision and accuracy compared to single frame action detection model as in **Fig 3**

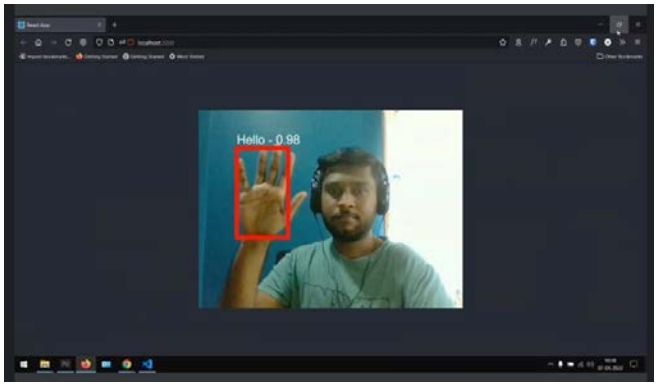

Fig. 2. Action detection with pre-trained tensorflow model

7. CONCLUSION

Computing is a very important tool in providing accessibility for sign language users. Here Action Recognition is being used as a means to detect sign language actions performed in front of a video recording device such as a camera. Many iterations of training may be done to improve the accuracy of the model obtained. The output obtained

is either displayed as a means of communication or further used as input in other applications whichever is deemed necessary

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Automated diagnosis of Alzheimer's disease using CNN

Faiza , Farheen Kauser , G. Sai Charith , G. Lalasa , Anooja Ali

School of CSE REVA University

Abstract- Alzheimer's disease damages brain cells over time, especially in the hippocampus area. This illness is the foremost cause of dementia in people aged above 65. It is a neurological condition that is both progressive and irreversible. An early sighting of Alzheimer's disease is pivotal because it could help prevent catastrophic brain damage to the brain. An accurate and rapid treatment of the disease is crucial to prevent the irreversible illness from progressing. The goal of this research is to develop a machine learning algorithm for identifying Alzheimer's disease using Magnetic resonance Imaging (MRI) data. The recommended strategy focuses on the brain's hippocampus area. The dataset has been acquired from Kaggle. The study uses an effective method of using a Convolutional Neural Network (CNN) which predicts whether a patient is impacted by the condition or not. The proposed technique results in prediction accuracy of 81.15%.

Keywords: Convolutional Neural Network (CNN), Alzheimer's disease, Hippocampus region, Machine Learning Algorithm, Magnetic resonance imaging (MRI)

I. INTRODUCTION

Alzheimer's disease is a degenerative neurological disease which often manifests in middle age and worsens over time. One of the most common causes of dementia in the elderly people is this disease [1]. This is a long-term degenerative condition that gradually weakens and eventually kills one's thinking capacities, resulting in a significant loss of analytical and mental strength, as well as behavioral and language challenges. Heredity and lifestyle are the common factors affecting AD.

AD begins in the hippocampus (brain area where memories are created) and proceeds in a central-fugal pattern to various parts of the brain [2]. Plaques and tangles are two of the disease's most prominent symptoms. The healthy neurons begin to work less effectively as tangles and plaques rises, and they gradually lose their ability to function.

Many people worked hard to come up with a range of strategies for detecting Alzheimer's disease with the help of MRI data [3]. Two of these tactics are the extraction of preferential features from a massive number of features and the selection of efficient classification methods utilizing machine learning approaches [4]. An MRI scan is used to give a high-contrast image of the brain. The protein analysis of AD can detect the biomarkers and helps in target drug designing [5].

Due of its numerous layers and possibly ordered structure network, Machine learning let the machine to learn how to categorize data from scratch [6]. CNN, is a form of neural network for extracting high-level characteristics from image classification and prediction [7][8]. Due to its strong performance in picture classification and analysis, it is also the most often used deep learning approach.

The foregoing is the order of the paper: Section 2 reviews usage of various techniques employed in Alzheimer's Detection. Section 3 gives the CNN Architecture used for Alzheimer's prediction. Section 4 presents a comparative analysis of the work carried out. At the last, the conclusion of obtained work is presented in Section 5.

II.LITERATURE SURVEY

Due to its great many layers along with an ordered network, deep learning being a subdivision of machine learning that helps machine to gain an understanding of categorization from primary data [9]. This section shows a brief about various techniques used by researchers and authors in diagnosing AD using MRI data.

Basher et al., [10] In their proposed work, the detection of AD is with the usage of MRI. Features such as the texture, area, and shape are drawn out using the Gray-Level Co-Occurrence Matrix (GLCM) and Moment Invariants from the hippocampus. GLCM collects the second-order statistical texture, features, and Moment Invariants to define the group of attributes used for the identification of shape. The disease is later classified into different categories based on the features obtained from the hippocampus, using Artificial Neural Network (ANN) which is trained using Error Back Propagation (EBP) algorithm.

The detection of Alzheimer's Subjects and to analyze images of Alzheimer's Disease-related regions of the brain, Lodha in [11] have used MRI scans to get numeric data which in turn is processed using algorithms like gradient boosting, K-Nearest neighbor, Random forest. Nagarathna [12] has used a hybrid method. For detection and classification, the authors used a hybrid model, which is a combination of two models, which is of VGG19 and additional layers, as well as a CNN deep learning model. The comparison and classification of the various phases of Alzheimer's disease, their performance demonstrates that the hybrid model, is effective in recognizing and categorizing the various stages of Alzheimer's. The dataset for magnetic resonance imaging was examined.

The research by Sayed Us Sadat is [13] aimed at classifying Alzheimer's disease into three stages namely, very mild (early stage), mild (middle-stage), and moderate stage (late-stage). The authors here applied five prevailing efficient and promising CNN models using transfer learning, including VGG19, ResNetv2, ResNet152v2, EfficientNetB5, and Inception-ResNetv2, they have also implemented a custom model of their own, and they ensembled three times with a variety of model combinations to improve their final results. As a result, they were able to attain the proposed model, a weighted average ensemble of six parameters with desired results.

Chima S Eke [14] developed a system to recognize probable blood-based non-amyloid biomarkers with the help of SVM for initial AD detection. Convolutional Neural Network has greater affinity while choosing various prediction techniques that involve images as input data. It is an efficient and go-to technique in classification prediction problems.

III.METHODOLOGY

In this segment, we discuss the dataset, proposed methodology and the CNN model generated for the proposed work.

A. Dataset Collection

Our trials were carried out using the Kaggle dataset, link for the dataset- https://www.kaggle.com/datasets/tourist55/alzheimers-dataset-4-class-of-images. This dataset makes it simple to explore and analyze MRI scans. The dataset comprises of MRI pictures that have been processed. For the training stage of our work, we use 5121 pictures (classified into 4 different stages namely Mild Demented, Moderate Demented, Non

Demented, Very Mild Demented). A total of 1279 images were used in the test phase. Table 1 shows the number of images for each phase of the training dataset.

Table 1. Number of images for each phase of the training dataset.

Stages	Number of images
Mild Demented	716
Moderate Demented	51
Non Demented	2559
Very Mild Demented	1791

B. Proposed System

Two steps involved in our method are : extraction of region of interest being the first step and classification of images being the second. Flowchart representing the identification of AD by the method proposed is shown in Fig1.

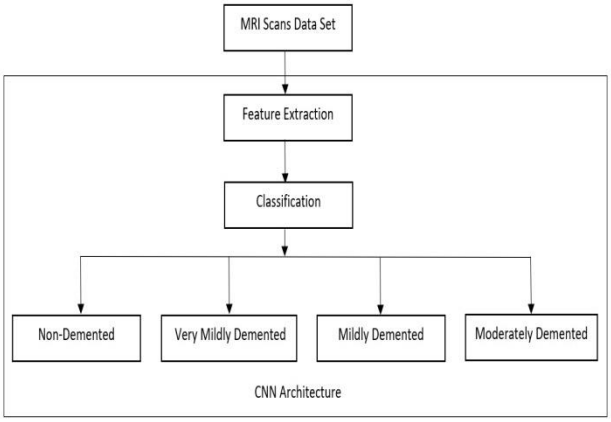

Fig.1 Flowchart representing the identification of Alzheimer's Disease by the method proposed.

Region of interest extraction: In image processing, you need to extract the area of interest. There have been several strategies identified, some of which are more proficient than others. Our work uses block splitting. The idea behind this technique is to split the image in 32 * 32 pixel square fragments. Next, we only need to extract the blocks that contain the hippocampus area in the brain. The remaining portion of the block will then be discarded.

Classification: A classifier divides different objects into different classes based on some classification criteria. There are four classes in our situation, those are, Mild Demented,

Moderate Demented, Non-Demented, Very Mild Demented. As a result, when the blocks have been eliminated, the CNN method will be used to carry out the classification step.

C. CNN Architecture

CNN is a layered network structure that evolved from the classical neural network approach, layered perceptrons.

The first part is the convolution, which acts as an image feature extractor. Convolution maps are created when a picture is run through a series of filters. Next, assemble the convolution map to create the feature vector. This vector is combined with the input in the next half of the classification section, which consists of fully connected layers. and allows images to be classified into four categories. Our networks have three convolution layers with 3*3 filter sizes and 32 filters with ReLU activation function, and the output is provided by a completely connected layer. The structure of this network is depicted in Fig.2.

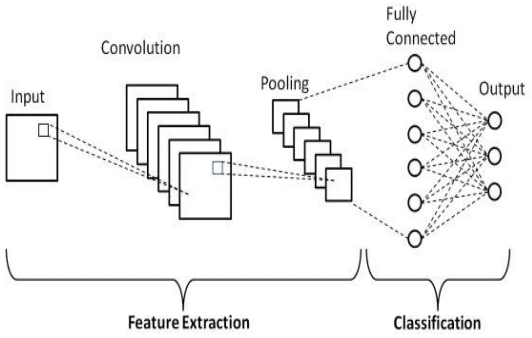

Fig 2. CNN Architecture

The convolution layer: Drag the filter over the entire image to convolve it with the underlying image [15]. The filter starts at the apex left of the image and shifts a few squares to the right as the convolution progresses. Moves downward one step until the filter traverses the complete image until it reaches the end of the image. The intend of this technique is to highlight key features of the images.

The pooling layer: This layer allows us to reduce the dimension of an image while keeping its necessary properties. 'Max Pooling' is the most commonly utilized method. It involves shrinking the image while retaining the pixels' highest values [15][16].

The fully connected layer: The classification rationale is done via these layers subsequent to numerous convolution and pooling layers have been applied. The neurons in this layer are connected to all the neurons from the previous layer[17]. The Softmax function is used to extract the probability distribution vectors from the outputs of this layer. The size of the vector returned by this function is N, where N stands for the amount of classes in our picture categorization task. The likelihood that the input image belongs to a class is indicated by each element of the vector.

IV. EXPERIMENTAL RESULTS

Python is used as software development language for the training and testing the model. For the implementation of the model, the machine with Intel i3, 12GB RAM, and Windows 10 operating system is used. Tensor Flow is being utilized for both training and testing of the model on the backdrop of keras.

Data aggregation was performed during the experiments and the image dataset was integrated. We used methods concerning to photo flipping, image rotation and zoom range. The standardized classifiers like svm, decision tree and LDA are found to be inaccurate due to the feature dimensionality of the dataset, and all these methods do not provide accurate results for image classification as compared to cnn algorithm which work well for image classification. Therefore we have employed CNN model to detect and forecast Alzheimer's disease using MRI scans. The model obtained 81.15% test accuracy rate. The precision and loss of the model's training and testing are represented as graphs.

In Fig 3, the training set is utilized to train the model and the validation to evaluate the performance of the model. The loss of model training and validation is shown in Fig 4. Losses are calculated for both training and validation, the interpretation of which depends on how good the suggested system works in the two sets, and the loss value is how fit the model is after every optimization iteration, which is used to indicates whether it works poorly or well.

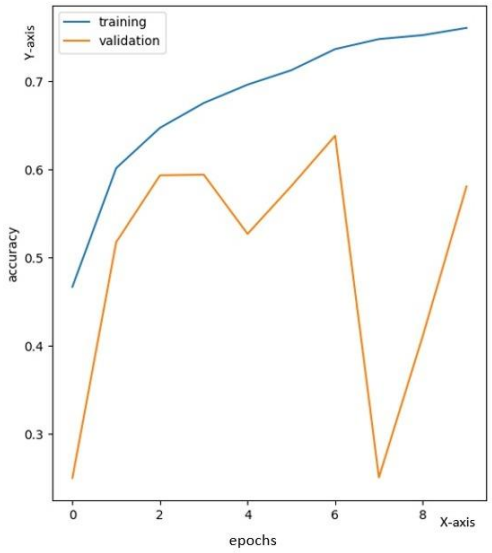

Fig 3. Accuracy indication of training and validation of the model

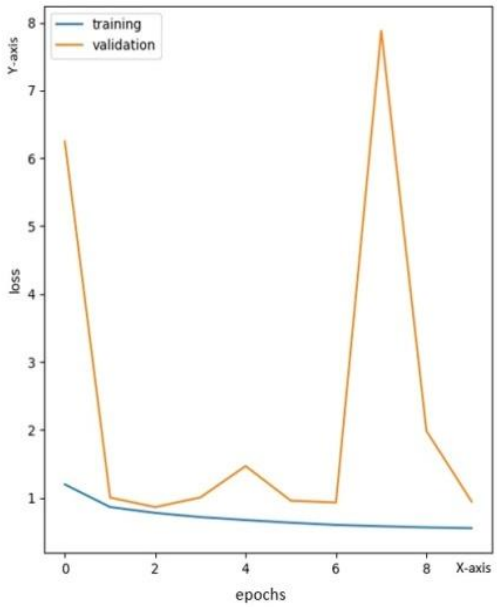

Fig 4. Indication of training and validation loss of the model

V.CONCLUSION AND FUTURE WORK

Alzheimer's disease progresses slowly over time. When it reaches the severe stage, the person is completely dependent on others for care. In this paper, a CNN algorithm-based technique for early Alzheimer's disease detection was applied on Kaggle dataset. The texture, area, and shape features of hippocampus regions are extracted from MRI scans. After extracting all the features, the percentage of the Alzheimer's in an MRI scan will be displayed on the web page. The accuracy attained after training and testing the model was 81.15 percent. The advantage of the proposed method is, it is used to detect Alzheimer's disease at a faster rate as compared to other traditional methods such as blood test.

As a future work, the outcome might be enhanced further by using a deep convolutional neural network, with potentiality in neuroimaging research. Furthermore, precisely adjusting the CNN model can improve the performance further. The hippocampus region of an MRI was the focus of this study. Other two perspectives (Axial view and Sagittal view) can be employed in the future to identify the disease's markers. In the future, the experiment might be repeated with a new dataset from a different organization, and it could potentially include alternative modality datasets.

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Off-Grid Solar Power Management with Agricultural IOT System

[1]Amogh R Kuravatti, [2]Vivek V Tamashetti, [3]Abhijeet Jena, [4]Dr. Venkatesh Prasad Ks

Authors affiliation, [1]amoghkuravatti@gmail.com,[2]ragavendra015@gmail.com, [3]jenaabhijeet16@gmail.com.

Abstract.

Recently over time the climate change and rainfall patterns have been changing rapidly and becoming unpredictable for growing crops in farm fields. As a result of this in recent times, clever climate systems called smart agriculture have come into the picture and many Indian farmers are slowly adapting to smart agriculture due to its advantages. Smart Agriculture is a method where the manual process is automated with the help of information technology integrated with IoT. IoT is being widely used and the scope for it is being drastically increased in the areas of wireless environments. Usage of smart sensors and wireless networks merging with IoT technology have led to different models of smart agriculture used in different conditions to support sustainable agriculture. The whole model is merged with internet and wireless communication leading to the Remote Monitoring System being introduced and proposed. The main objective of smart agriculture is to collect all real time values from the sensors for agricultural production areas which will make it easy for the user to control the farm using an android application which will be electricity efficient in operating the motor with all the crucial notifications included in the application about the farm field. As compared to previous models our model fills a gap of efficient electricity usage which is not implemented in previous models.

Keywords. IoT, Smart agriculture, Smart electricity usage , Irrigation , Frontend , Automation , Wireless sensors.

1. INTRODUCTION

Agriculture is one of the significant sources of livelihood in India. Over the past decade, we've seen that there hasn't been any sizable crop development in the agricultural sector. A primary cause of this is contaminated waters, low soil fertility, misuse of fertilizers, unpredictable climate change, and many more. Our concern is to solve these problems by introducing the inventions in agriculture using IoT named Smart agriculture via wireless sensors and networks. Smart agriculture using IoT has the potential to improve and

revolutionize agricultural development, which can contribute significantly to sustainable agriculture in the long run. The Internet of Things (IoT) includes three-phase systems, the vision layer, network layer, and application layer. The visual layer includes sensor motors and Information and Communications-enabled (ICT) devices. Sensor motors are the building blocks of sensory technology including sensors and a network of sensors used to collect real-time information. Network coverage is the IoT infrastructure for universal service access. It guides the integration of the visual layer and the application layer. An application layer is an interface that integrates IoT with industry-specific technology. The internet of things has worked in many industrial areas, such as smart agriculture, smart trafficking, pollution intelligence monitoring, transportation, and health care, and much more. Among them, agriculture is one of the most crucial areas for millions of people.

2. LITERATURSE SURVEY

This section discusses the relevant technologies that can be used by researchers who have attempted to address the implementation of Smart Agriculture. India constitutes over 60% of its land for agricultural practices with an arable land of 159.7 million hectares making it the second-largest country for Land area for Agricultural practices. Even so, in the past 5 years, there has been a total loss of 35.54 million hectares of cropland due to unstable climatic conditions and human error.

This paper, describes a very well proposed model which consists of many analysis sections for an overall framework for advanced agriculture with the help of Integrated Circuits and Sensors and finally robotics for fruit picking and irrigation but, the approach had its limitations such as model accuracy and security of the data. Their main focus was cost-effectiveness but the introduction of robotics, it makes a toll on their overall capital. [1]

This particular paper focuses on predicting the irrigation requirements using the ground hardware components such as soil, humidity, and environmental conditions. The paper proposes a smart model which considers all sensed data, process the data, and predicts the output on irrigational parameters. All the sensor values are stored in the cloud and accessed by multiple web applications which provide real-time information on all the collected values. The results provided by the model is highly accurate and highly encouraging.[2]

This particular paper proposes to develop a smart agricultural model where the irrigation of the crops is controlled by a web application based on the reading of the wireless sensor networks. This model mainly contains three main components which are hardware, web application, and mobile application. The hardware component mainly has two sensors, soil and moisture sensor which is used to send real-time values of the crops to the mobile, and a web application which is used to smartly irrigate the farm field. The major drawback of the model is there is no efficient usage of electricity usage leading to an inefficient model.[3]

This particular paper explains the importance of wireless sensors and sensors' future scope for IoT in agriculture and all the problems expected to be faced in connection and merging these technologies with

3. OBJECTIVES

Technology and IoT have the potential to transform agriculture in many fields.

- Data, tons of data, compiled by smart agricultural sensors to better improve future decisions using AI & ML

4. METHODOLOGY

A. *Sensors used to collect data:*

Farm fields may have different crops growing at the same time at different parts of the agricultural land. In the farm field mainly 2 main sensors are fitted and being used in the project namely DHT22 sensor which is the Temperature sensor and Humidity sensor for getting environmental condition and Moisture Sensor measurements into the real time input to the back-end server. The sensors are directly connected to the main microcontroller ESP82. ESP32 microcontroller is low cost and low power using a microcontroller which includes integrated Wi-Fi for additional functionalities and better usage of microcontroller. The real time sensor values are fetched and uploaded to the backend server which can be further processed for useful decisions and processes.

B. Data collected stored at back end:

Here the real-time values which are collected by the sensor are being stored over cloud. The data from the cloud can be used at any time using different devices and applications to process the data. The data is stored in a Cloud server known as Blink backend server.

C. *Frontend used to display the data*:

The clients are given access to the system with an user-friendly and easy to operate application or a website through which the user can completely see all previous inputs from the bink server and completely control the farm field. The real time data are accessed from the app servers and are being processed and presented in a very meaningful pictorial and graphical standard which is easier to understand the condition of the crops. The clients are given the frontend which is given by blink server which is a very reliable and secured third party framework which supports all kinds of major frontend languages like html, css and all kinds of latest frameworks.

D. *Solar panels for smart electricity usage*:

Additionally 6 small solar panel is connected to a battery to convert solar energy to electrical energy and connected to the farm field which can be used to power up the whole motor for complete irrigation and can be helpful in providing electricity for the whole farm house.

E. ***Smart agriculture model with efficient electricity usage*:**

This proposes a smart agriculture model for irrigation of crops using solar power energy leading to efficient usage of electricity without paying bills of electricity. As a result, it will help a million of farmers to make use of smart agriculture which can turn huge profits during a short time and less investment.

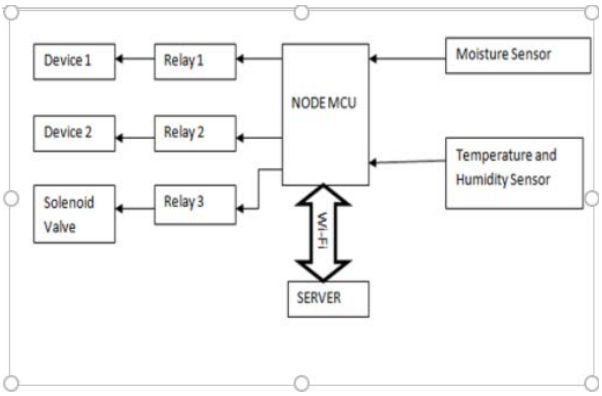


Fig.1: overview of working of model

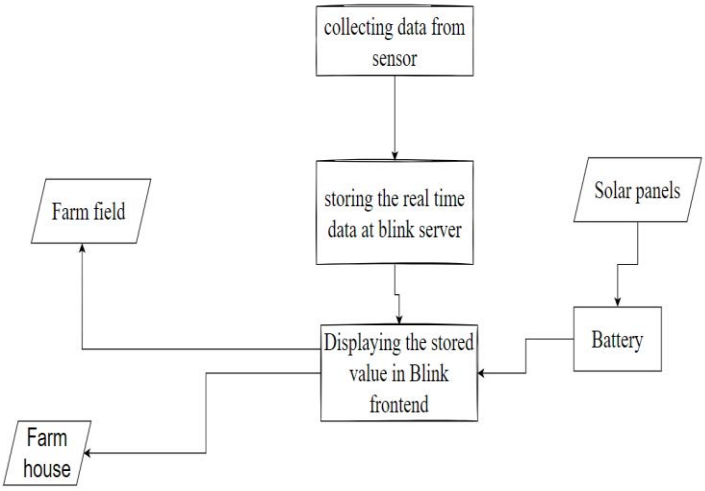


Fig 2: The whole flowchart of working of the model.

5. IMPLEMETATION

1. Components required: -

ESP82 or sometimes called NODEMCU is a very reliable, secured, easy to use and popular microcontroller used in many prototypic concepts and sometimes in industrial standards. The main implementation of the project is as follows: -

i. The user is given a blink front end website which is user friendly and easy to operate through which the whole Farm can be controlled.
ii. The sensor values can be stored and used for decision making so that the user will get the productivity out of the best.
iii. The whole scenario can be divided into two different modes one as manual and one is automatic, over the manual the irrigation can be done manually based on the real time values of the sensors or in the automated method the irrigation system will be automatically powered on when the particular threshold value is crossed.
iv. In Automatic mode the complete control is given to the controller itself so much less responsibility is removed from users.
v. From the app the user can have access to other devices in or out of the farmhouse. Ex: Lights, Actuators. Components Used in the prototype are:
    - NodeMCU (ESP8266)
    - Soil-Moisture sensor
    - DHT11 sensor
    - Relay Module
    - Water Pump
    - Green Led with resistor
    - 12V supply for pump

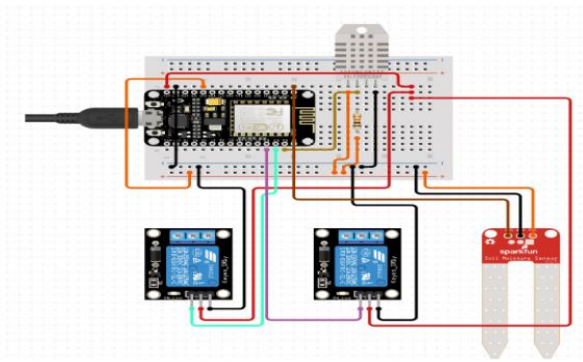


Fig.3 Sample connections to the Nodemcu.

2. Snapshots:-

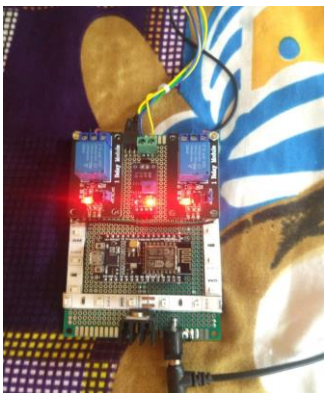
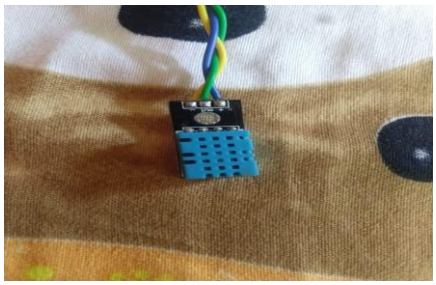


Fig.4: Photo of the working of Arduino Chipset



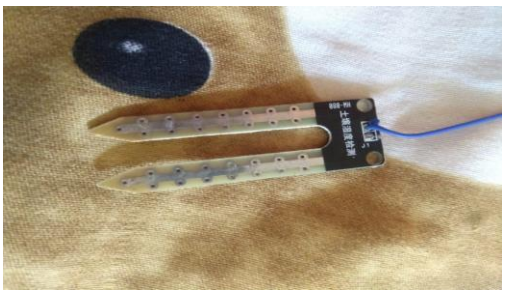


Fig.5: Humidity Analyzer (*Top-one*), Soil Moisture Sensor (*Bottom one*)

6. EXPERIMENTAL RESULTS

Fig 6: Real time values of the sensors

In the above fig (fig 6) the blink frontend application is displaying the real time values of the following Temperature, Humidity and Moisture Sensors .

Fig 7: Real time battery status.

In the above figure (fig 7) , Real time battery status is being displayed in the blink frontend application and can be used to turn on/off the motor for the irrigation which is available in auto and manual mode . In auto mode the motor is started automatically after crossing the threshold value and in manual we can turn the motor on/off manually.

7. CONCLUSION

This project proposes a smart agricultural model with integration with IOT. IOT has always been the top priority and importance in the field of agriculture. Previous farmers have grown a lot of crops over centuries due to which the farmers had a nice idea about all conditions to make maximum profit from crops but due to rapid and undesirable climatic changes and soil changes have made a tough challenge for the farmers to grow crops. Through the approach given in this paper the new adoption of smart agriculture with smart electricity usage with help of solar panels will help farmers to adapt to the undesirable changes and to get maximum benefit out of the crops. This is a crucial and challenging task which requires a lot of knowledge to predict the climatic changes in different contexts and over different farmlands. This model of smart agriculture will help the farmers in every aspect to get maximum yield with smart electricity and smart irrigation with less human introversion.

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Vehicle Accident Alerting System based on IOT

ADARSH H J[1] , Bhaskar Reddy P.V[2]
[1]PG Student, [2]Professor, School of Computer Science and Engineering, REVA University, Bengaluru-India.
adarsh75588@gmail.com, bhaskarreddy.pv@reva.edu.in

***Abstract*— In daily walks of life, automobiles are gaining more prominence as their usage is rapidly increasing. These days numerous mishaps happen on streets due to escalation in traffic or reckless driving. In most of the circumstances, delay in informing family members or the emergency authorities' outcomes in a deferral of clinical guide to the victim, which may on occasion end up being fatal. The main objective of this system is to intercept such contretemps. It ensures security by alerting the passengers in the vehicle in case of any possible vulnerabilities inside the vehicle detected using various sensors. In case any accident occurs, the system sends accident alert notification to the designated authorities by which they immediately track the vehicle through location of the vehicle sent by system using GPS sensor. The system also captures and detects the vehicle ID on the number plate of the vehicle which caused the accident to the victim's vehicle which is notified to the authorities using which they can track the vehicle and investigate regarding the accident. This automatic number plate detection (ANPR) functionality utilizes Optical Character Recognition in identifying the characters in Vehicle ID of number plate which is implemented through MATLAB. The notifications are sent to mobile as an SMS using GSM embedded Arduino shield immediately reducing the possibility of loss of life due to delayed medical assistance. This is hence a vehicular safety monitoring and alerting system.**

Keywords— Sensors, OCR, Automatic Number Plate Recognition, Arduino GSM Shield

I. INTRODUCTION

In recent days traffic injuries are increasing annually, inflicting a big quantity of death and disability instances. According to the World Health Organization (WHO), 1.35 million loss of life cases occur worldwide every year, representing 2.2% of the full quantity of deaths. The important motives of these traffic injuries are speeding, rash driving, driver's enervation, obstacles on roads, and terrible infrastructure. Most of the fatalities in these injuries occur due to the late response from emergency clinical assistance. The time after the stressful damage is called golden hour, wherein offering essential scientific and surgical resource at that point increases the possibility of saving human lives through one-third on average. Thus, sizeable efforts have been allocated inside the recent beyond with the purpose of supplying green and prompt rescue operations. IoT is one of the gears that has been utilized to attain this goal.

The IoT become offered again in vehicle industries to offer unique facts and amusement packages with the intention of presenting a comfortable riding experience and comfort journey. Recently, the IoT has been hired to growth the protection of drivers and passengers. Several studies have offered IoT structures to hit upon, localize, report, model, and analyze avenue accidents.

Automatic Number Plate Recognition (ANPR) technology [1] reads the vehicle number on the license plate of the vehicle supported by Optical Character Recognition. This technology is contributing towards uprising the autonomous transportation systems making them intelligent from a long time. Earlier this technology which was just used in traffic signals, tolls and vehicle parking areas is now being used as mobile technology in handheld smart devices. ANPR framework perceives the enrolled number plate with no extra transponder prerequisites.

The proposed system aims at providing immediate support to any unintended casualties which may result in accidents. This framework uses Arduino microcontroller as an agent to read and report the sensed data. Sensors like flame detection sensor, speed detection sensor, alcohol detection sensor are used to detect any corresponding vulnerabilities in the vehicle. Piezo disc sensor triggers when there is a collision when accident occurs. GPS tracks the location of the accident-prone vehicle. The system also contains automatic number plate recognition functionality to capture and detect vehicle ID of vehicle that caused accident to the victim vehicle. It uses Optical Character Recognition to recognize the characters on number plate. This detected vehicle number will be sent to the controller. All these notifications are sent using GSM module via SMS to the concerned authorities and family members of the accident victim.

II. RELATED WORK

The postponement in protecting an individual during mishap is overcome through constructing a gadget using Arduino Uno, GSM, and GPS to apprise the emergency facilities quickly due to prevalence of the injury caused [2]. Further, GPS is used to obtain latitude and longitude of the mishap occurred region.

A concise review on few techniques on avoiding accidents and detection of accidents due to discrete criterions [3]. It incorporates two scenarios i.e., Pre- accident alert where the accidents can be avoided before their occurrence using V2V and VANET vehicular communication methodologies. Post-accident alert mechanisms utilize a few strategies to recognize the mishap cause and affirms the event of mishap and later cautions the salvage groups to give clinical assistance to victims.

The framework identifies [4] and orders vehicle mishaps in view of seriousness level and reports the fundamental data about the mishap to crisis administrations suppliers. The framework comprises of a microcontroller, accelerometer, GPS, a gathering of sensors to decide different actual boundaries connected with vehicle movement. Vibration sensor determines vibration within vehicle and ultrasonic sensors reduces speed of vehicle when there is any obstacle ahead. GSM message alerts are sent to emergency contacts.

Mechanisms to capture the number plate of vehicles that cross the threshold speed avoid the mishaps caused by over speeding vehicles [5]. The vehicle with speed greater than that of restricted is caught automatically with assistance of sign communicated to camera from microcontroller that relates to the speed detection sensor. Later, at that point, license plate is elicited from the whole picture utilizing picture capturing device. When the area of interest is distinguished the person are perceived and refreshed in the information base.

A framework [6] that advises concerned individuals about occurred disaster utilizes GPS-GSM modules and accelerometer is interacted with Arduino uno which goes about as regulator was developed. Accelerometer identifies mishap by an adjustment of preset worth of the vehicle direction and sends location co-ordinates tracked by GPS to enlisted contacts by means of GSM with next to no extravagance of the driver or travelers.

The accelerometer works in distinguishing area and assuming upsides of three-dimensional boundaries are greater than characterized measurements by the code composed for starting insinuation and message alert gets implemented. With this strategy [7] mishap area is identified effectively, and the data of mishap area can be sent by means of the GPS to the crisis contributions for help.

Differing structures of characters on license plate portrays extra challenges. To resolve this issue, inception v-3 model is utilized for classification of license plate's structure defined pictures [8]. The concentrate then, at that point, utilizes single-shot recognition, which is one of the most mind-blowing accessible engineering to distinguish numerous items without a moment's delay, bringing about quicker and more exact location. Later every character in license plate is perceived by Tesseract OCR motor.

Image processing technology-based system like ANPR is used to capture and detect characters in the preprocessed images of vehicle's license plate [9]. The preprocessed image is segmented, and the individual characters are identified using Optical Character Recognition

III. OBJECTIVES OF PROPOSED SYSTEM

The major intent of this system is to monitor the vehicle for casualties to ensure safer transportation. Following are achieved by this system:

- SMS alerts to designated contacts when Flame is detected
- SMS alerts to designated contacts when Alcohol presence is detected
- SMS alerts to designated contacts when over speeding is detected
- SMS alerts to designated contacts when collision of vehicle to adjacent vehicle is detected.
- Live location of victim vehicle and vehicle license number of adjacent vehicle causing accident are also detected and notified through SMS alerts.

IV. METHODOLOGY

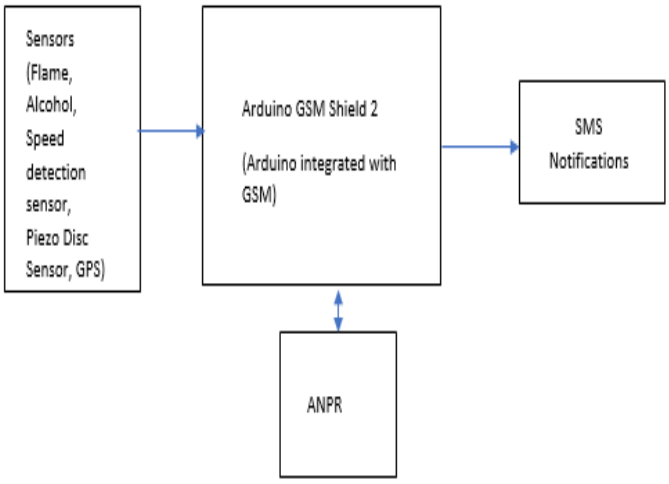

Figure 1: System Architecture of alerting framework

Figure 1 describes comprehensive system architecture of proposed alerting framework where various sensors embedded in this system will monitor any vulnerabilities occurring in the vehicle and sends the sensed data as input to the Arduino controller.

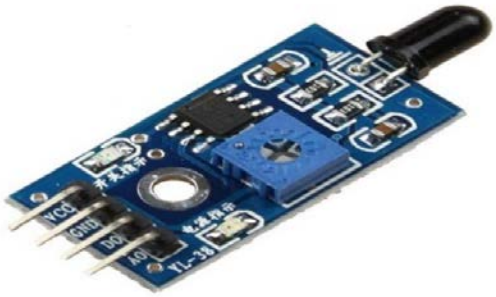

Figure 2: Flame Sensor

Flame sensor : It senses the occurrence of flame or fire in the vehicle and alerts immediately. It detects a wavelength range (760 nm – 1100 nm) from light source when it placed at a certain distance from the source. It gives analog or digital signals as output which is sent to the controller.

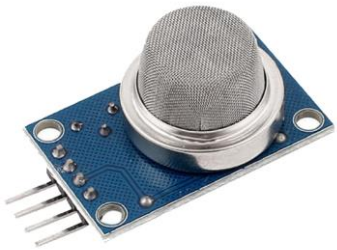

Figure 3: MQ2 Sensor

Alcohol Detection sensor: MQ2 sensor is used to detect the presence of alcohol. When the person driving the vehicle has consumed more alcohol, there is a risk of any mishaps to occur if he goes unstable to handle the vehicle. To prevent accidents due to this the alcohol detection sensor is used which senses the alcohol content in the person's breath and notifies it.

Figure 4: IR Sensor

Speed detection sensor: The IR sensors attached to the ends of the vehicle can be used to calculate the speed of the vehicle. After continuous monitoring of speed if it crosses the set-up threshold, the system is alerted as over speeding.

Figure 5: Piezo Disc Sensor

Piezo Disc sensor: This sensor works on the piezo electric principle. It measures the changes in acceleration, pressure, force, or temperature. This triggers when there is a collision due to accident and sends analog signals to the Arduino. The Arduino controller digitizes this information and alerts as accident occurred.

Figure 6: GPS Sensor

GPS (Global Positioning System) Sensor: It uses ground stations and satellites to gauge and compute location it is placed on the Earth. GPS module obtains location information in the form of NMEA String output in which the string contains parameters like latitude, longitude, time, etc. The GPS sensor sends the co-ordinates of the location where accident occurred to the nearby hospitals and concerned authorities so that quick action can be taken and rescue the injured victims.

Figure 7: Arduino with GSM shield

Arduino GSM shield: Arduino board establishes a connection to the net, remit and receive SMS, and to make voice rings utilizing the GSM library. These functionalities of GSM module are achieved by GPRS (General Packet Radio Service). To establish internet communication the GSM should have a registered SIM card with a subscribed data plan. The GSM module embedded in the system sends a quick SMS alert of accident occurrence and location to the concerned authorities and family of the victim so that they can reach the spot quickly.

ANPR MATLAB implementation: The system also consists of MATLAB program which captures the image of the vehicle ID on the number plate of the vehicle which caused the accident and detects the same. This detected vehicle ID is sent to the target audience through GSM as a text message. This eases the investigation process of the accident occurred. This functions and sends output to Arduino shield through the internet provided by embedded GPRS technology. MATLAB has Optical Character Recognition capabilities which follows Automatic Number Plate Recognition technology.

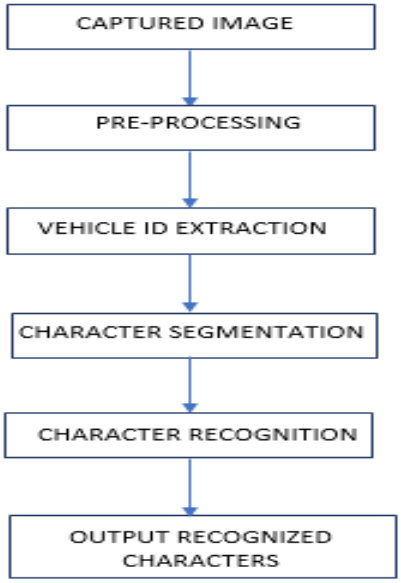

Figure 8: Workflow of ANPR system

As described in work process of ANPR (Figure 8) images are pre-processed to extract the vehicle ID on the number plate region. Pre-processing involves grey-scaling and tuning of images followed by binarization. Each character is segmented and identified through OCR. The combined character set is displayed as output which is the vehicle ID.

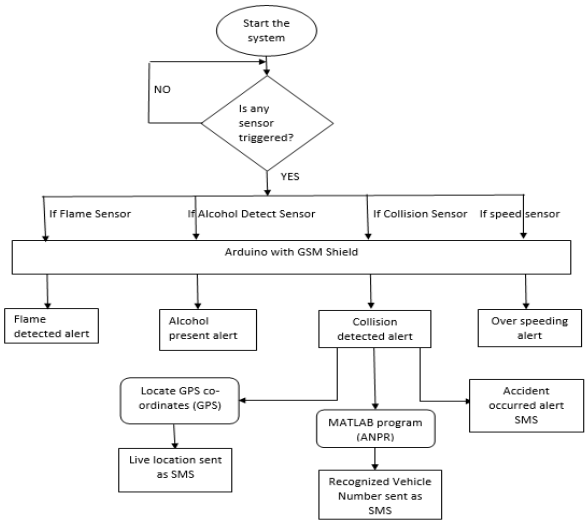

Figure 9: Workflow of alerting system

The system starts when the vehicle accelerates. It monitors for any triggering of sensors as described in workflow (Figure 9). If flame detection sensor is triggered due to the occurrence of fire inside the vehicle, an SMS alert is sent through Arduino GSM shield as Flame detected. If the alcohol detection sensor is triggered due to the presence of alcohol in the surrounding, an SMS alert stating Alcohol presence detected is sent. If the IR sensors monitoring the speed of vehicle detect any hike in speed of the vehicle which has crossed the threshold, over speeding alert is sent. In case of accident occurrence, the collision detection sensor (Piezo Disc sensor) is triggered, and an alert is sent, followed by the location co-ordinates detected by GPS and the ANPR methodology is triggered to capture the image of the number plate of the vehicle causing accident using either the rear or front cameras and the corresponding Vehicle number is obtained through SMS. All the SMS is sent to the respective phone numbers of victim's family members and nearest medical AID providers and other legal authorities. In this way, the threat due to accidents can be controlled and risk of loss of lives can be prevented.

V. EXPERIMENTATION

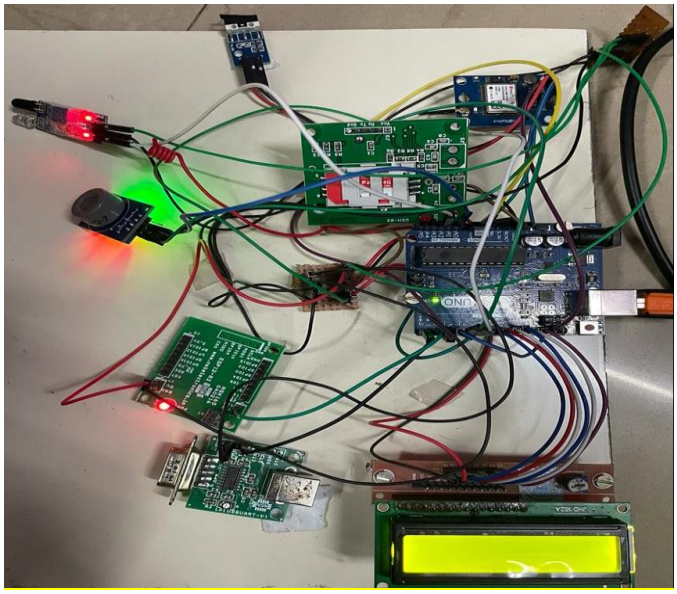

Figure 10: Experimental Setup

Experimental prototype is setup as in Figure 10 which will be embedded in the vehicle (car). System starts once the vehicle starts accelerating, activating all sensors connected to Arduino embedded with GSM module. Sensors monitor for any vulnerabilities in the surrounding as per their functionality. They get triggered respectively when following scenarios arise and corresponding results are obtained as illustrated on LCD.

Flame detection: Fire might occur due to accidental ignition of flame inside the vehicle, electrical malfunctioning, or mechanical breakdowns. They can be placed inside the car and can be embedded near engine. Flame Sensor connected to Arduino module monitors for presence of flame inside atmosphere of car and triggers once fire is detected and outputs displayed alert (Figure 11).

Figure 11: Flame detection alert

i. Alcohol presence detection: Alerting when driver of car has consumed alcohol will reduce risk of catastrophes due to unstable driving. MQ Sensor connected to Arduino module monitors for presence of alcohol inside the atmosphere of car which will be placed near driver's seat and triggers when alcohol is detected in driver's breath sending alert message to the concerned contact as displayed on LCD (Figure 12).

Figure 12: Alcohol presence detection alert

ii. Over Speeding Detection: Over speeding results in tragic misfortunes due to collision of vehicles. IR sensors placed at front and rear end of car measures and monitors speed of it. Once it breaks threshold speed Sensors trigger an alert stating over speeding detected as displayed (Figure 13).

Figure 13: Over speeding Alert

iii. Accident detection: Piezo Disc Sensor connected to Arduino module monitors for collision occurrence and triggers when our vehicle collides with adjacent vehicle conveying displayed alert message (Figure 14) to emergency contacts.

Figure 14: Accident Alert

Once accident is detected, GPS attached to car records the current live location and sends location co-ordinates of mishap location to emergency contacts of victim as displayed (Figure 15).

Figure 15: GPS live location co-ordinates

The MATLAB code for ANPR is also triggered. MATLAB implementation can be embedded inside front and rear ends of vehicle with cameras attached. This captures the image of adjacent vehicle (Figure 16), processes it (Figure 17 and Figure 18) and detects the Vehicle number present on license plate region using OCR (Figure 19). The Vehicle ID of adjacent vehicle causing accident to victim vehicle is then sent as SMS to emergency contacts which helps in easing investigation process by crime squad.

Figure 16: Captured Image of License Plate

Figure 17: Pre-processed Image of License Plate

Figure 18: Segmentation of characters

The system alerts and re-monitors again after flame, alcohol and speed sensors are triggered. The system stops when collision occurs.

All the displayed outputs on LCD are transferred as SMS to respective emergency contacts through GSM module.

Figure 19: Resultant vehicle number recognized through OCR sent as alert

VI. Results and Discussions

Figure 20: SMS Notifications received through GSM.

The Figure 14 depicts the SMS alerts received by the proposed system whenever a particular sensor is triggered due to the vulnerabilities caused in the surrounding. When Flame sensor, Alcohol detection sensor (MQ3), IR sensors monitoring the hamper in speed above the threshold, Piezo Disc sensor detecting collision are triggered, the respective alerts such as Flame detected, alcohol presence detected, over speeding detected, accident occurred are sent through the SIM number inserted in GSM to the designated mobile numbers. Along with accident alert, live location of the vehicle along with location co-ordinates and vehicle number on the license plate of vehicle causing accident is detected and are sent as SMS notification. By this the family members and medical aid authorities can reach the spot where accident occurred to save the victim's lives and legal investigation can be eased as we have detected the vehicle causing accident.

VII. Conclusion and Future Scope

This paper discusses about anticipation of accidents caused by any unusuality in the vehicle like fire occurrence in the vehicle, over-speeding of vehicle and drunk driving which are sensed by various sensors embedded in the vehicle through immediate alerts. For scenarios where accident occurs unexpectedly, the collision detection sensor reports the accident and location of vehicle tracked by GPS is notified to the rescue authorities for clinical aid through SMS sent by GSM module. This system uses Optical Character Recognition to identify the vehicle number of the vehicle causing accident which is also sent via SMS immediately so that culprit responsible for the mishap is investigated and caught quickly. As a part of future enhancements, this framework can be improvised with other safety implementation sensors and enhanced image preprocessing and character recognition methodologies.

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SECURE AND EFFICIENT DATA CLUSTERING AND CLASSIFICATION USING XOR ALGORITHM

[1]S. Ranichandra, [2]S. Dinesh, [3]R. Jeeva, [4]S. Selvakumari

Department of computer Science, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Email: ranichandras2523@yahoo.com (**S. Ranichandra**) *Corresponding author:* S Ranichandra

ABSTRACT

When it comes to real-time data mining, there are several applications across a wide range of industries including finance, communications and biotechnology as well as the government. One of the most important aspects of data mining is classification. Because of the rise in privacy concerns, several theoretical and probable solutions to the categorization issue have been presented under various sureness models. Because the data in the data mining is encrypted, existing privacy protecting categorization algorithms are not connected to one another. Because the data in the data mining is encrypted, all privacy-preserving categorization techniques now in use are irrelevant. Based on the dataset, this research focuses on tackling the classification issue. Using the data mining strategy, we offer a safe k-NN classifier over encrypted data. Privacy of data, user input queries, and patterns of data access are protected by the proposed k-NN protocol. First of its kind in the standard using XOR encryption method, our work develops a safe k-NN classifier over encrypted data. An additional level of security is provided by using a secure kNN protocol that secures data, user input queries, and data access patterns. In addition, we conduct trials to test the efficacy of our processes. According to our studies, a user may utilise any mobile device to make a kNN query using our secure protocol, which is highly efficient on the user's end.

Key words: kNN Classifier, security, graph pattern matching, encryption, privacy preserving, secure protocol.

I. INTRODUCTION

Data mining is a powerful new method for sifting through massive amounts of data to find valuable information. Pattern recognition and numerical and mathematical approaches may also be used to identify new connections, patterns, and trends by analysing large volumes of data. The KNN-classification of time series is an important area of machine learning because of the vast volume of time-series data that is used in real-world applications. When it comes to storing, accessing, and processing information, the cloud computing concept is revolutionising N businesses' methods. Many organisations are drawn to cloud computing because of its affordability, adaptability, and reduction in administrative burden. In most cases, organisations outsource both their data and their computations to the cloud. Despite the many benefits of the

cloud, corporations are unable to take use of them because of privacy and security concerns in the cloud. Encryption should be performed before data is sent to the cloud if the data is very sensitive, While it may be possible to do data mining operations without ever decrypting the encrypted data, this is not always the case [1]-[5]. .

Additional privacy issues have been verified by the following example. As an example, consider the following: Let's say an insurance firm decided to outsource the encryption and data mining of its customer database to the cloud. In order to identify the risk level of a potential new client, a categorization approach may be used by a corporate representative. A data record q for the client must first be created, which contains information such as the customer's credit score, employment location, age and marital status. As a result, the cloud may then use this documentation to figure out how many students q. needs to take the class. However, since q contains sensitive information, q must be encrypted before being sent to the cloud in order to preserve the privacy of customers. It is clear from the model above that data mining on a cloud containing encrypted data necessitates safeguarding a user's record. Even if the data are encrypted, the cloud can still get relevant and responsive information about what is really being accessed by observing the data access patterns. Therefore, the three privacy/security criteria of the cloud encryption challenge are: (1) privacy of the encrypted data, (2) secrecy of a user's query record, and (3) thrashing data access patterns. Existing work on Privacy-Preserving Data Mining (either perturbation or secure multi-party computing based on come close to) cannot overcome the encryption challenge [6]-[10].. This approach cannot be used to protect highly responsive data because troubled data lacks semantic security. Also, the data mining findings generated by the troublesome data aren't particularly accurate. This shift toward SMC requires that data be shared unencrypted among the parties involved. Non-encrypted data is used in many transitional calculations.

Encryption as a means of ensuring data privacy in the cloud may result in another problem during query processing. In general, it is very difficult to process encrypted data without having to decode it. The challenge here is how the cloud can run searches over encrypted data while the data stored in the cloud is always encrypted. Range queries and other collective inquiries have been suggested in the literature for query processing over encrypted data. However, the k-nearest neighbour (kNN) question cannot be answered using these approaches since they are either ineffective or inapplicable.

Classification is one of the most often used data mining techniques, and each approach has its own advantages. A security-based XOR technique is used to encrypt data in a cloud computing environment and perform k-nearest neighbour categorization [11]-[13].

Clustering

Clustering in data mining is necessary to classify patterns that are not immediately apparent. Traditional clustering algorithms are complicated by the characteristics of huge data: In the actual world, data is made of both numerical and category elements. Data that is a combination of both numerical and category kinds does not do well in most clustering techniques, whereas data that is solely numerical does.

For most clustering approaches, it is necessary to repeat the process many times before the grouping becomes better. Data mining applications may become unusable if the process takes an excessive amount of time.

Single-machine clustering methods and multiple-machine clustering techniques are the two most common types of data clustering. Because of their increased scalability and quicker response times for end users, multiple machine clustering approaches have recently gained a lot of interest. According to Fig. 2, clustering strategies that use one or more machines cover a wide range of methodologies:

Clustering on a single computer

Techniques that are based on samples

Measurement reduction methods

Clustering of many machines

Clustering in parallel

Clustering with Map Reduce

CONNECTED WORKS

[6] Fanyu Bu, Zhikui Chen, Qingchen Zhang, and Xin Wang [6] propose a k-means method based on partial distance (PDK algorithm). Imperfect information may be clustered using the PDK-means improved k-means method, which uses partial distance [4]. First, determine the distance between each item and each cluster so that objects may be assigned to clusters based on their proximity; second, figure out the mean value of each cluster so that the cluster centres can be updated. The execution time required by PDK-means is much smaller than that of PDPCM, especially when the data set is large, demonstrating that PDK-means achieve better for clustering incomplete high-dimensional big data. The PDK-means method outperforms the PDPCM algorithm in the tests. In addition, grouping incomplete high-dimensional huge data requires far less time than previously thought possible..

We originally proposed an unique density-based clustering technique, termed DBCURE, which is strong to locate clusters with various densities and suited for parallelizing the process using MapReduce. [12] In addition to discovering clusters with varied densities, DBCURE may also be used in a Map Reduce structure to find clusters. The parallel method DBCURE-MR was then devised and the correctness of DBCURE-MR was shown using Map Reduce. We demonstrated that our DBCURE-MR quickly detects precise clusters with unstable densities and scales up well with the Map Reduce structure by providing experiment results with varied datasets.

CURE's agglomerative HBC technique is presented by S. Guha, R. Rastogi, and K. Shim [14]. As soon as a partition has been generated, it is treated as a partial cluster in this technique. The last step is to eliminate outliers from each partition's data before creating final clusters. All of the cluster medoid (centroids) nearest to each other in a cluster are mixed in each stage of the method (merged). Only representative objects (centroids) will be combined in this technique, which employs a single linkage mechanism to choose several centroids from each cluster. It is impossible to quantify the joint interconnectivity of points in two distinct clusters of information while using this approach, which is a disadvantage. Chameleon algorithm [15] is used to get around this problem.

HBC agglomerative techniques, like as "CHAMELEON," may be used to decide dynamic modelling, according to E.-H. Han, V. Kumar, and G. Karypis [15]. A graph partitioning approach is used in the first step of this algorithm, which separates (partitions) data items into sub-clusters, before merging the sub-clusters and creating a final cluster. This approach is used to discover cluster densities in 2D (two-dimensional) space, where the clusters have varying forms and sizes. The Chameleon approach employs a dynamic model to create any cluster shapes and arbitrary cluster densities. The technique is useful for applications that deal with enormous amounts of data. Because CHAMELEON is known for its low dimensional data space, this is its biggest drawback.

Second, Data Mining That Protects Your Privacy (PPDM)

By using Privacy Preserving Data Mining, information about data may be extracted without compromising the privacy of the data (PPDM). Privacy-preserving categorization methods have been suggested in the literature during the last several decades. Based on a distributed training dataset, the goal of privacy preserving classification is to build a classifier that can predict the class label of an input data record.

Classification is a critical part of many data mining applications, including health care, retail, college, and business, among others. Data mining on the cloud has recently attracted much notice. Using cloud computing, a user puts his or her data in the hands of a cloud service provider. However, users' opinion is that privacy is a major concern when responsive data is outsourced to the cloud. The quickest approach to ensure the security of outsourced data is to encrypt it before it is sent to a third party.

Due to the following reasons, conventional privacy preservation classification approaches are not suitable or relevant to PPkNN, which hosts data in the cloud in encrypted form.

The data in present systems is divided between at least two parties, but the data in our instance is encrypted and kept on a cloud. (iii) Existing approaches are inaccurate owing to the loss of information due to the creation of statistical noises in order to hide the sensitive characteristic. It is possible for the cloud to get sensitive and important information about users' data items by just analysing the database entry patterns. In this study, we do not feel that the k-nearest neighbour approach, in which the data is discrete between two parties, is safe.

SYSTEM ARCHITECTURE

The system architecture consists of three practical components in Figure 1, Client, Data Server, and Backend Server.

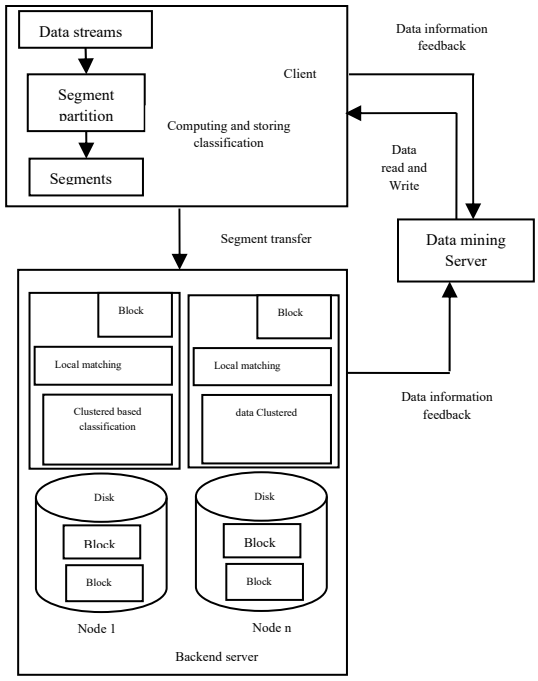

Fig 1 System Architecture

• The client gathers backup datasets and talks with the storage node and data server to replace information. In addition, the client does segmentation and data categorization, stores graph data via clustering, and distributes segments to storage nodes.

Data Server is responsible for storing and retrieving all graph index patterns matching files and segments.

In order to store the backup and to delete redundant data, backend servers are used. For parallel deduplication, the system calls for many storage nodes.

Implementation of our clustering-based categorization system. To distribute files to the nodes, a backup stream is split. Local graph index similarity is checked when a new data segment is received. The segment data is not saved if it is the same. The system refers to the block as "equivalent" if the similarity between it and the current block is strong. Similarity in graph index is checked when the data segment has a low degree of similarity. The approach assigns a data segment to a node if the data segments have a high degree of similarity. Home node stores and updates the clustered graph database server of other nodes if the segment data graph is not a high similarity is shown in figure 1

INTERNET CONNECTION

This module's primary purpose is to upload their data to the data server and store it there. The data owner encrypts the data file and then stores it on the server for security reasons. The owner of the data has the ability to decrypt and re-encrypt the file is shown in figure 2.

XOR IMPLEMENTATION

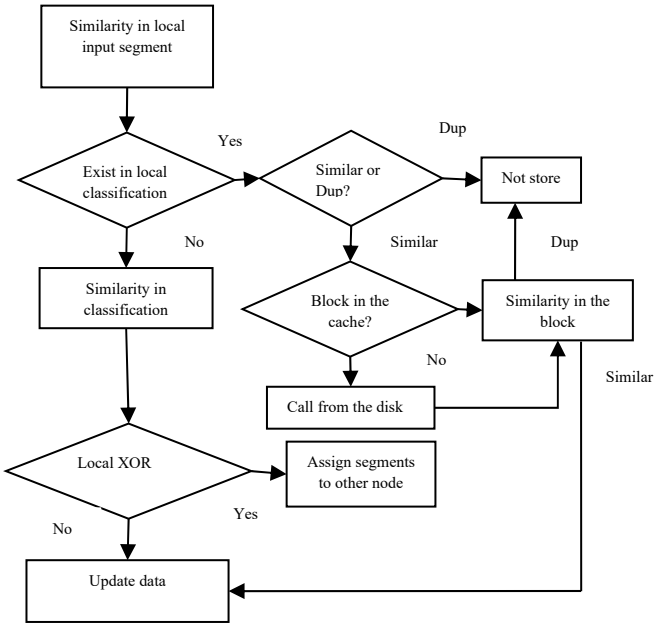

Figure 2 XOR implementation

EVALUATION

In order to measure our system's performance, we conduct memory and throughput tests. False positives are tolerated by the systems. The data sets are made up of files that have been backed up sequentially. Our approach is compared to two other situational algorithms, the Overlapping clustering algorithm and the slicing algorithm, for the elimination ratio. When testing memory for duplication eradication, the incremental backup is employed. As the number of nodes in the cluster grows, so does the experimental throughput for data categorization. Our system's performance will be evaluated via this experiment is shown in figure 3.

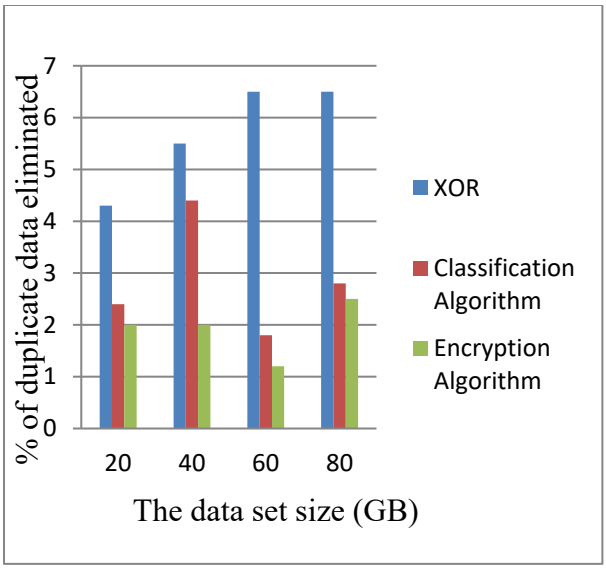

Figure 3 the percentage of performance

As the amount of the backup rises, we term our system XOR encryption; KNN with XOR improves roughly 60% to 68% of the data's speed. There is a 64.5 percent data rate ratio on average. Classification and encryption algorithms have average elimination rates of 28.38 percent and 23.23 percent, respectively. Our approach outperforms categorization and encryption algorithms when it comes to removing malware. Some data in the file is duplicated, and this is not exploited by overlapping clustering. A backup stream's inherent locality is used by an encryption technique. Because of this, if the data sets don't have a location, it'll lose its benefits and only find a small amount of redundant data. Our technique identifies more data duplications in a comparable data collection than any other. Pattern matching is used to discover comparable segments in the local graph pattern table, and a multi graph method is used to detect duplicate segments in the node.

CONCLUSION

As the amount of the backup rises, we term our system XOR encryption; KNN with XOR improves roughly 60% to 68% of the data's speed. There is a 64.5 percent data rate ratio on average. Classification and encryption algorithms have average elimination rates of 28.38 percent and 23.23 percent, respectively. Our approach outperforms categorization and encryption algorithms when it comes to removing malware. Some data in the file is duplicated, and this is not exploited by overlapping clustering. A backup stream's inherent locality is used by an encryption technique. Because of this, if the data sets don't have a location, it'll lose its benefits and only find a small amount of redundant data. Our technique identifies more data duplications in a comparable data collection than any other. Pattern matching is used to discover comparable segments in the local graph pattern table, and a multi graph method is used to detect duplicate segments in the node.

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Voice bot: Customized Voice-Chat bot using Natural Language Processing

R Sharanya, Rithin S Reddy, S Asha and Naveen Chandra Gowda

School of CSE, REVA University, Bangalore, India

Abstract.

The Chatbots have a demanding requirement in today's automated world in fields like Marketing, Supporting Systems, Education, Healthcare, Entertainment, etc. Though chat bots are still in their relative infancy, technologically they have existed for decades. The bots provide ease of communication and good customer service. There are many chatbots present in the institutional environment but it still lacks in terms of excessive manual power expanded regardless of its automation due to limiting database (lack of content in the database) or unsatisfactory responses and also being inconsiderate towards disabilities. The Voice Bot tackles these situations by providing an immense database with multiple responses and giving cacographers and disabled users an interactive experience through speech recognition.

Keywords. Speech recognition, institutional environment, disabled users, cacographer, Voice Bot

1. INTRODUCTION

Chatbot is considered to be an instant messaging platform and an effective auto-response system for a two-way dialogue with human users. The bots are existing and are growing with the increase in demand. They are used across industries like healthcare, travel industry, banking, human resource, e-commerce, and personal services to provide information in conversation mode.

The first bot to be made was ELIZA and was developed by Joseph Weizenbaum on the basis of a keyword matching technique [1]. The bots have adopted new technologies over the upcoming years like the usage of Automatic Speech Recognition model which is dependent upon the voice of the speaker [2]. The general purpose chatbots are difficult to design as they require a more complex knowledge base to meet the needs of different domains, hence developing it in a particular realm is preferred [6]. One of the biggest domains where they are utilized is the scholastic environment, for example, the institutional websites or course sites where the interaction is provided to the students or users to solve queries or report progress.

Chatbots, though being a new way of interaction in the academic front like online platforms and devices still lack in areas concerning the customer satisfaction which is achieved through a good database of responses, the observed responses of the existing

chat bots are not the user desired outputs and in some cases very confusing to understand. At the end of the day, manual power needs to be expanded to persuade and resolve the issues on the user end. It falls behind in terms of automation and manpower, archive content, unsatisfactory responses, and consideration shown towards disabilities.

The usage of chatbot can happen through text or voice inputs, depending upon the context it can be deemed less or more valuable. Instead of understanding and going with the chatbot creator's view, it can apply an user focused approach on how the chatbots are received and the way people experience it in their daily lives.

The problem in the context is the common scenario seen in academic environments where students do cumbersome and taxing manual tasks that require human involvement in most of the cases, majority of the current existing chat bots provide only the textual interaction and a limited database for the query response and do not take disabilities into account, hence it's confined to solving a small set of user queries. The convenience could be improved if the system is not only text-based but also voice-based and trained along with a customizable database. This is the problem addressed by the paper.

The Voice Bot eradicates most of the human intervention by helping users with tasks or queries with respect to the scholastic domain, it provides information to users when they require it and gives the option of querying and chatting in both voice and text, making it flexible and user-friendly while providing an interactive, immersive experience in an automated environment. It also improves productivity by reducing the crowd at the help desk and human efforts by giving quick responses and being easily accessible. With the enabling of voice-based interaction, it serves the purpose of being useful to disabled and cacographic users.

The paper is sectioned into the following distributions as follows: The I part is about introduction, II section explains the Literature survey with the related works, III section provides information on the proposed work through the methodology, algorithm, and system design, the IV section describes expected results and experimental analysis, the V section talks about limitations, VI is the conclusion and the future work section and VII is the reference used for the paper.

2. LITERATURE SURVEY

2.1 RELATED WORK

Over the past decade, chat bots have garnered a lot of attention in most of the online domains, e.g. E-commerce platforms, travel sites, online ticket booking sites, government sites, College websites, company websites, etc. A number of selected research papers between the years 1966 and 2021 are examined and described below.

The introduction of the chatbot happened through ELIZA, the first bot made on the pattern matching domain. ELIZA was created by Joseph Weizenbaum by utilizing the keyword matching methodology. The process involved the reading of the provided user input and searching for specific keywords based on which the answer was retrieved. In case the required word is not present then the conversation between the user and bot continued. The input queries are analyzed based on the rule of decomposition which utilizes the keywords and the generation of response are made by reconstruction rules in accordance with selected decay law. The basic issues with the author's bot are the response generation in keywords absence, script editing provisions, identification of keywords, etc.

The [4, Fig. 1] shows an example of a sample queries asked by the user.

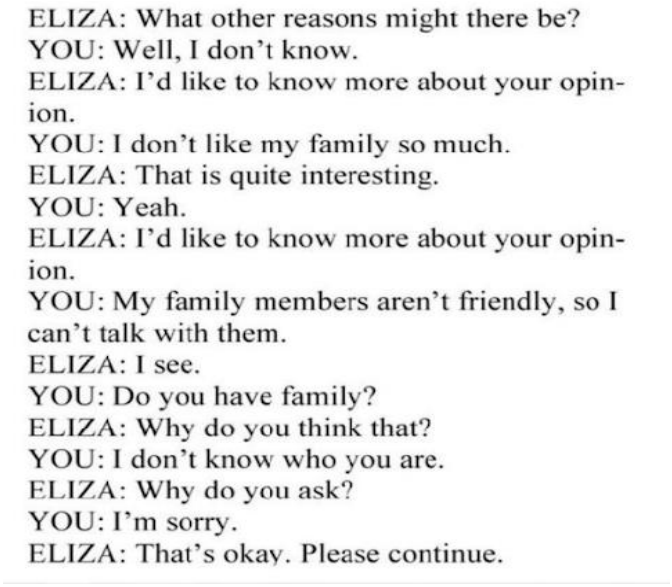

Fig. 1: A Sample Conversation with ELIZA from Munira Ansari, Saalim Shaikh, Mohammed SaadParbulkar, Mumbai, India, "Intelligent Chatbot", IJERT, NREST – 2021 Conference Proceedings.

In Paper [2] the purpose of this paper was to introduce the Automatic Speech Recognition model, which is a stand-alone speaker, word-based and low-key vocabulary by recognizing phonemes, phoneme collections and words. It has developed an app that serves as a Basic English language course. The proposed paper is for the benefit of the disabled. The proposed work is 78 percent accurate according to the studies made.

In Paper [3] the author aims to help reduce organizational dependency on people and reduce the need for othersystems for various processes. The proposed chatbot identifies the user context that triggers a specific response objective. As it responds to a flexible response the response you want will be created for the user. The proposed system has used ML(Machine Learning) algorithms to learn Chatbot by meeting the responses and requests of various users.

In Paper [4] the chatbot queries used to resolve users' queries, provide information to users as they need it, improve service time quality and make customers happy by providing intelligent solutions. Students can connect to the chatbot on the web via a laptop or smart phone. Students can ask different questions about the details of admission in the native language and both can answer their questions with appropriate answers. The proposed app was easily accessible to customers and provided feedback to users anywhere at any time.

The author of the paper [5] explains about the types of chatbots used and the examples and specific enhancements that can be made. Many institutions are attracted to technology to improve their customer support when they encounter technologies like chat bots that enter into as flawless service assistants in such situations. One of the possible solutions discussed on paper is the emergence of a voice-based chat bot that

allows for two conversations between a client and a computer using the human voice as a means of communication. This voice-based bot can help become a valuable asset for the client.

In this paper [6], the reviews include a selected count of papers focused on Chatbot design strategies over the past decade.

The contribution of each study is analyzed and identified. This paper presents a survey on the designed techniques used in the chat bot on the domain of speech conversion between the two entities human and computer. The author concludes by remarking that chat bots are deprived of a common solution, researchers need to document the improvements done on the bot in order to improve the speech interaction between the entities.

The end objective of the project is to demonstrate chatbot using the deep learning models. Recurrent Neural Network and other sequential learning models are not able to achieve this task. Also the Natural Language Processing model undertakes a lot of data which can be considered difficult to gather when it comes to small scale implementations. Hence the paper implements SLM (sequence learning model) along with LSTM (Long short-Term Memory) [7].

The paper[8] presents various constraints presented in chat bot like the problems of the consumer seen in general usage, for example the lack of customer service, limited data storage and the bad optimization of the results. The author compares the two models which are used for chat bot on various factors like sentence responses provided, accuracy measurement, the LSTM and BiLSTM (Bidirectional Long Short-Term Memory). The major focus area of this paper is on finding the best suited and most effective model for the chat bot to work efficiently.

2.2 GAPS

- ELIZA [1] has technical problems such as keyword identification, limited content, and the provision of editing of its own documents.

- In paper [2] the proposed system was developed to have external sound defects and a little vocabulary in the system.
- In paper [3] the system provides two types of inputs but is lagging behind in providing two types of outputs, providing textual responses.
- Paper [4] provides a web-based chatbot with machine learning that is used to generate responses and text output.
- Paper [5] explains about the future enhancement as the voice based chat bot which can prove to be a beneficial client communication asset.
- Paper [6] reviews a selected number of chatbot design strategies.

The proposed system works on the provision of keyword retrieval keywords on the website, providing comprehensive content in the archive, and the provision of document editing and site customization according to user needs. The system uses audio filtering with a power threshold in the speech recognition python. Provides dual input and output type for speech-to-text conversion and text-to-speech conversion.

3. PROPOSED WORK

The system proposed is based on Artificial Intelligence, the Voice Bot utilizes the python programming language to provide an interface for the user to interact with as the GUI (Graphical user interface). The bot uses multiple API's (Application Programming Interface) for the speech recognition and text to voice conversion like the Speech Recognition and REST (Representational State Transfer), Django etc. For getting responses from the back end it utilizes SQL (Structured Query Language).

3.1 SYSTEM MODEL

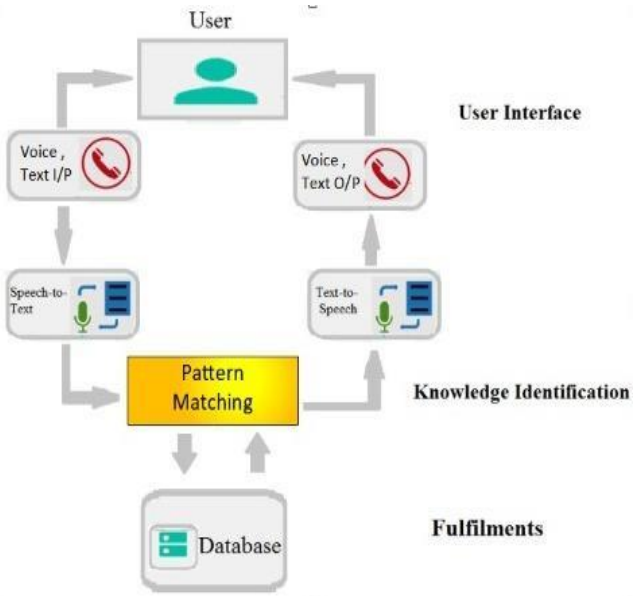

Fig 2. System Architecture of Voice bot

The Fig. 2 explains how the voice chatbot handles the queries from the user to give responses through speech and text with the help of text-to-speech and speech-to-text conversion and fetching responses from the database after pattern matching.

3.2. MODULES

3.2.1 VOICE TO TEXT DIAGRAM

The text to speech conversion system utilizes the speech recognition package where feature extraction takes place and the acoustic and language modules are applied to give out the textual output in the notepad. The user's input in the speech or voice format is converted to text and printed in the notepad as shown in Fig. 3.

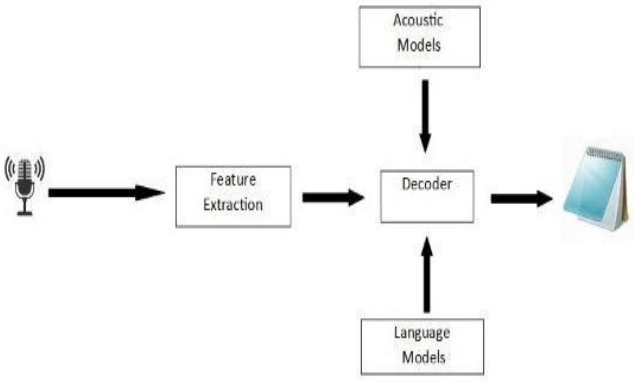

Fig. 3: Speech to text converter process in notepad

3.2.2. VOICE CHATBOT

The Voice chatbot makes use of the speech to text converter and also implements text to speech to provide the response. It uses Natural language processing with speech recognition and pyttsx3 (python text to speech).The Fig. 4 displays the working of the Voice chatbot.

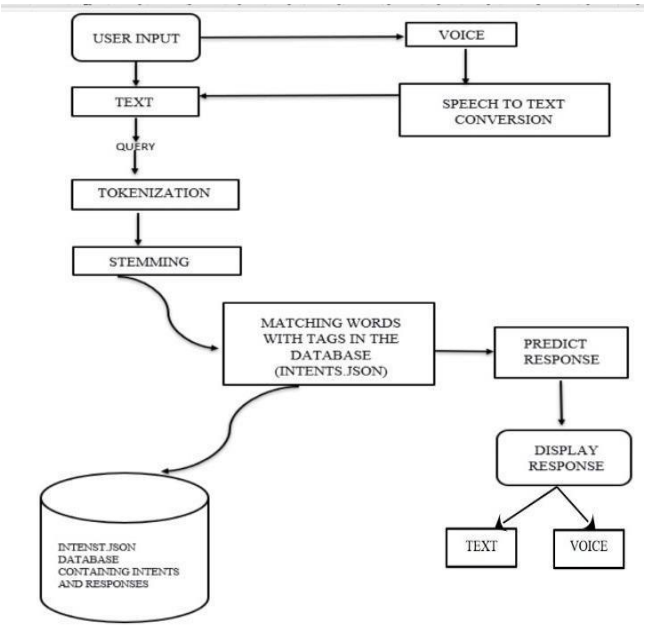

Fig. 4: The Working model of completed Voice bot

4. IMPLEMENTATION

4.1 ALGORITHMS

Lemmatization and POS (Part of Speech) tagging, using WordNet: Deleting of the data in the input text is done by removing keywords. The appropriate Lemmas keywords were obtained using the Lemmatization and POS tags, combined with a different type of translated word. WordNet from the Python package "NLTK (Natural Language Processing)" was used for this purpose.

4.2 NATURAL LANGUAGE PROCESSING

NLP (Natural Language Processing) is used as one of the most important concepts in bot design. Machines use sophisticated algorithms to separate any text content in order to extract meaningful information from it. The data collected is then used to further teach the machines the natural language skills.

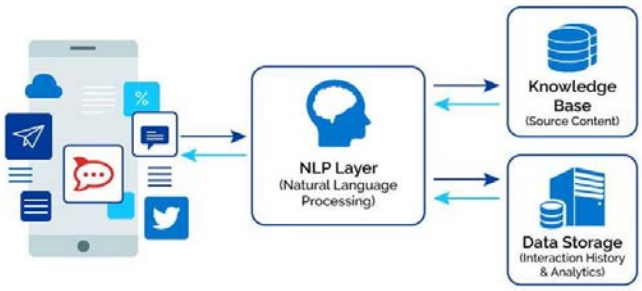

Fig5: NLP Working from KollaBhanu Prakash, "Chatterbot implementation using Transfer Learning and LSTM Encoder-Decoder Architecture", Volume 8.No. 5, IJETER, May 2020.

The Natural Language Processing layer utilizes both the data storage and the knowledge base in order to retrieve appropriate and accurate responses to the given query submitted by the user as shown in [7, Fig.5].

Incorporating NLP into chat bots gives the meaning of having higher human presence. When a chat bot is developed and used, this is a common use, hence there are questions asked regarding it. It seems so intertwined with human behavior that customers can try to trick and discard the chat bot. It can be solved by adding automatic answers, but that is often a failure as it is almost impossible to wait for what queries to be answered and how they will be solved. The goal of Natural Language Processing is to build a type of system that can understand and give meaning to a text and also perform tasks automatically like classification, translation, etc.

4.2.1 STEPS OF NLP ALGORITHM

1. Lexical Analysis – It is the first step in the Natural Language Processing responsible for the source code scanning in order to convert a string of characters into meaningful expressions, this phase divides the input text into sections, words and sentences. Tokenization, Lemmatization and Stemming techniques come under the Lexical Analysis.

2. Syntactic Analysis – This phase of NLP is mainly used for parsing and providing relationships between the different words and also to check their arrangement and grammar.
3. Semantic Analysis- This analysis is based on the meaningful representation of the words and it focusses on the literal meaning present behind them.
4. Discourse Integration – Integration of speech depends and is implemented based on the meaning of the sentences that come before it.
5. Pragmatic Analysis – This final phase focusses on information extraction from the provided text, it plays by a set of cooperative dialogue rules.

4.3 LSTM (Long Short Term Memory) ALGORITHM

Long Short Term Memory (LSTM) networks are a type of recurrent neural network required in complex problem domains like machine translation, speech recognition, and more .LSTMs are a complex area of deep learning.

The LSTM model network is called as the model that has influenced the past and is known to display the capability to learn from sequential data. LSTM consists of three gates-input, forget, output gates [7].

$f_{m+1} = ({}^{(h\to f)}h_m + \theta^{(x\to f)}x_{m+1} + b_f)$ forget gate (1)

$i_{m+1} = ({}^{(h\to i)}h_m + \theta^{(x\to i)}x_{m+1} + b_i)$ Input gate (2)

$c_{\tilde{m}+1} = \tanh(\theta^{(h\to c)}h_m + \theta^{(w\to c)}x_{m+1})$ update candidate (3)

$c_{m+1} = f_{m+1}\Theta c_m + i_{m+1}\Theta c_{m+1}$memory cell update (4)

$o_{m+1} = ({}^{(h\to o)}h_m + \theta^{(x\to o)}x_{m+1} + b_o$Output gate (5)

$h_{m+1} = o_{m+1}\Theta\tanh(c_{m+1})$ Output (6)

The above equations represent the LSTM model [8]. The input gate checks if there is a need to allow the fresh data or not, forget gate deals with the unnecessary details. The proposed framework approach consists of various steps, such as raw data selection, pre-data processing, feature extraction and NN preparation.

5. RESULTS AND DISCUSSION

Speech recognition systems are tested using two factors: Accuracy and speed. Platforms used for voice chatbot functionality Windows 10, Python 3.8 IDLE, and PyCharm 2021.3. The test requires the following specification: 64-bit operating system with Intel core Processor 5.1.60GHz, OS version - Windows 10 One Home Language, Ram - 8.00 GB.

The simulation of a voice robot is performed in two parts with respect to the accuracy of word recognition by pronunciation in English. Voice recognition module is said to boast about 75% - 85% accuracy under noise and greater than 85% in good conditions. The Table. 1 and Fig. 6 pie chart show test results of the conducted simulations.

Simulation (Eng.-in)	Total words	Detected Words	Undetected Words	Accuracy
1	80	75	5	93.75 %
	90	84	6	93.33 %
	100	92	8	92.00 %
	110	97	13	88.18 %
	120	105	15	87.50 %
Total	500	453	47	90.6%

Table. 1: Manual Analysis Simulation 1

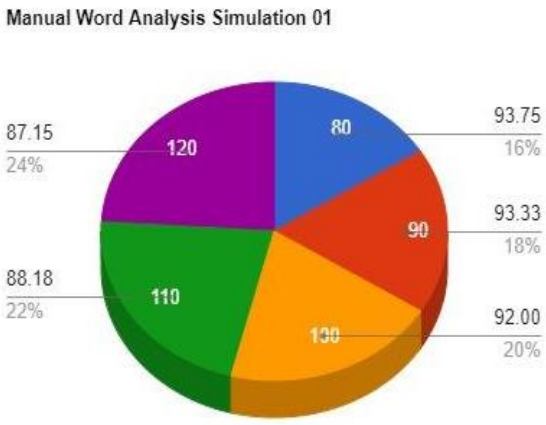

Fig. 6: Pie Char 1 for manual analysis 1

Second simulation was performed with a bit lower net speed and some introduction of background noise. The Table. 2 and the Fig. 7 pie chart below show the results.

The percentage is a bit less compared to previous simulation due to the presence of noise affecting the accuracy.

Simulation (Eng.-in)	Total words	Detected Words	Undetected Words	Accuracy
2	80	72	8	90.00%
	90	82	8	91.11%
	100	93	7	93.00%
	110	95	15	86.36%
	120	101	19	84.36%
Total	500	443	57	88.6%

Table. 2: Manual Analysis Simulation 2

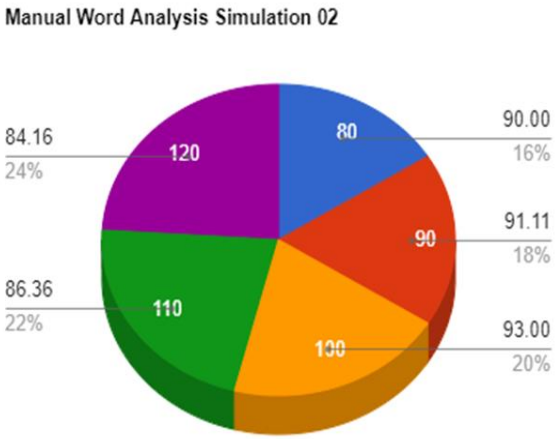

Fig. 7: Pie Chart 2 for manual analysis 2

6. OUTPUT RESULT

The outputs considering three scenarios are listed below:

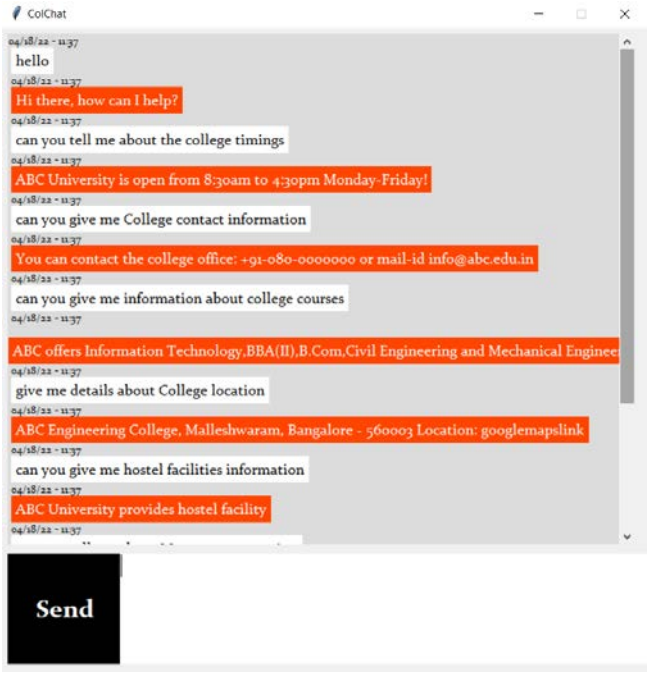

Fig. 8: Accurate Responses of the Voice bot

In Fig. 8 for any given input by the user or the customer as a query, the bot processes it and searches in the database, accurate responses are obtained in both textual and voice format to the user in the GUI (Graphical User Interface) and the speakers.

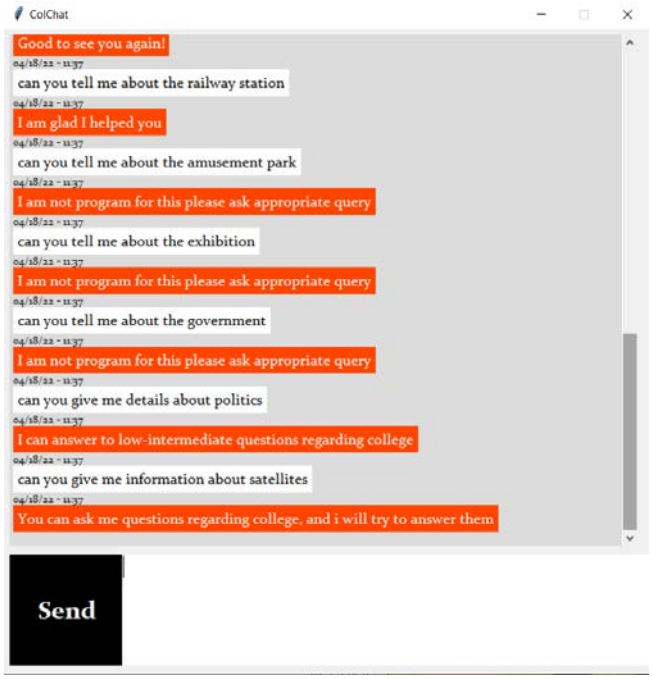

Fig. 9: Incorrect Response of the Voice bot

In Fig. 9 when the user asks queries not related to the domain the bot's response is as shown in the figure. Since the keyword is not found in the database the bot responds saying 'I am not programmed for this please ask appropriate query".

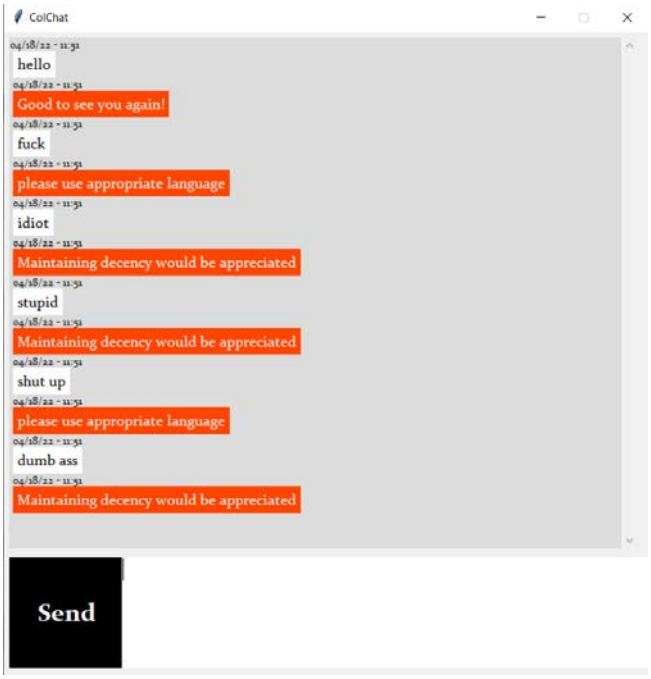

Fig. 10: Indecent Queries of the Voice bot

In Fig. 10 when the bot is misused by the user by cursing, it responds with either “Please use appropriate language or “maintaining decency would be appreciated”, which re the input given in the database for the usage of inappropriate queries. The bot can handle unethical behavior of users while taking the input from them. The database is equipped to handle such situations and if required can be improved with more content.

7. CONCLUSION

In today's world of automation the voice bot is well suited to its voice and text resources. The paper uses Voice Chatbots and Machine learning concepts, as well as NLP for input and feedback. The main goal is to reduce human interaction, increase automation, provide audio filters and provide in-depth information to disabled users and photographers by input and output in two ways. Objectives were introduced and applied to the bot.The bot can be made accessible to users on many web platforms on institutional websites, the accuracy of the bot can be increased through audio filtering functions. By combining a lot of pronunciation it can be used by different people. It can be upgraded to an app for frequent and easy access. It will be useful in all areas as without wasting much time, it gets to the right information and that too without filtering. It can be developed to receive queries in two languages and provide respond in the same input language as the user asks. It can be improved in the future by solving obstacles and taking it to the top in a web-based environment.

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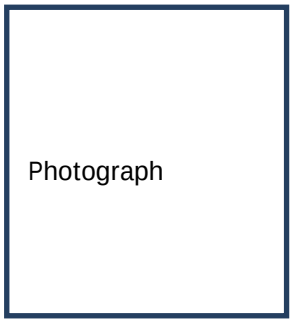
Biographies



Author Name received the bachelor's degree in computer engineering from Cankaya University in 2010, the master's degree in computer engineering from Gazi University in 2014, and the philosophy of doctorate degree in Electrical-Electronics & Computer Engineering from Duzce University in 2017, respectively. He is currently working as an Assistant Professor at the Department of Computer Engineering, Faculty of Engineering, Duzce University. His research areas include mobile security, deep learning, and social network analysis. He has been serving as a reviewer for many highly-respected journals.

AN APPROACH FOR EMERGENCY VEHICLE CONGESTION REDUCTION USING GPS AND IOT

Raghavendra Reddy[1], P.Vamsi Krishna[2], N.Naveen Chowdary[3], K.Panduranga[4], Nayaki Sony [5]

[1]Assistant Professor, School of Computer Science and Engg, REVA University, Bangalore – 560064
[2,3,4,5,] School of Computer Science and Engg, REVA University, Bangalore – 560064
[1]raghavendra.reddy@reva.edu.in
[2,3,4,5]R18CS273@cit.reva.edu.in, R18CS252@cit.reva.edu.in,R18CS274@cit.reva.edu.in,R18CS251@cit.reva.edu.in

Abstract— Traffic plays a very important role in our daily lives whether we are going to offices, schools or even when coming back to home. Everyone wants a peaceful way to reach their destinations. In case of emergencies like an accident, it's very much important that we have a proper system that can handle all these situations in a smarter way. Now with the existence of technologies like the Internet of Things, it's very easy to maintain these kinds of complex systems without human intervention. The main aim of our proposed work is to design a new traffic management system that can handle any of the given critical situations easily. The emergency might not be only for emergency vehicles such as ambulances or fire engines, it can be an emergency patient in a private vehicle who must reach the hospital as soon as possible. Any individual or an ambulance representative who is registered with the government database can make their vehicles as emergency vehicles if there is an emergency such as an accident so that they can reach a hospital as soon as possible. We are going to make an android application that uses GPS live location of the user and sends the data to the database such that the traffic signals can be changed accordingly and clear the traffic. Also, the system detects empty lanes using Passive Infrared (PIR) Sensors and changes their signal to red such that it reduces traffic congestion.

Keywords— Smart traffic system,Traffic congestion, Emergency vehicles, Ambulance, Global Positioning System, Traffic Flow Control.

I. INTRODUCTION

As per the reports, the traffic in India is worse than in any other country in the world. In a country with a population of 135 crores, it is very difficult to manage the traffic of this scale manually. Recently India has come up with the concept of Smart Cities, with the cities smarter than ever the need for automated traffic management is very much necessary in such cities.According to a survey, more than 20% of patients in need of emergency care perished on the road before reaching the hospital owing to traffic bottlenecks and difficult drivers.

Any individual or an ambulance representative who is in an emergency should be able to reach their destination as soon as possible. Using the Internet of Things, giving way to the emergency vehicle or clearing the lane in which the emergency vehicle is travelling might alleviate this difficulty.

The current invention is broadly directed to a system and method for tracking an emergency vehicle's real-time position and allocating a lane to the vehicleusing internet of things. The present invention more particularly relates to a system and a method for tracking the real time location of the emergency vehicle and allocate a lane for the vehicle.

The system makes use of GPS module in the andirod phones to detect the location of the emergency vehicle and that data is compared with the traffic signal geographic location present in the database. Which can be used to detect if an emergency vehicle is present near a traffic signal.

The main contributions of the paper are as follows:

- The proposed approach provides a system that tracks the real time location of the emergency vehicle.
- It alsoprovides a system that identifies the emergency vehicle and allocate a lane.

The rest of the paper is organised as follows. Section 2 examines prior research studies that have been conducted to analyse the information in order to arrive at the suggested strategy. The suggested technique is described in detail in Section 3. Section 4 examines the outcomes of the recommended method. Section 5 concludes the study with a brief summary.

II. LITERATURE SURVEY

Deepali Ahir et al. [1] presented an Intelligent Traffic Control System for Smart Ambulances, in which the ambulance driver uses an android application with GPS to identify the nearest signal based on the ambulance's current position. And that particular signal is turned green until the ambulance passes by, after which it reverts to its previous state. As a result, it is a life-saving project since it saves time during an emergency by controlling traffic signals. However, their project has a flaw in that the driver must manually manage the device, which could lead to more accidents.

Norlezah Hashim et al. [2] suggested a peripheral interface controller-based automatic traffic light controller for an emergency vehicle. During an emergency, this concept intends to assist emergency vehicles crossing the road at a traffic light junction. A Peripheral Interface Controller (PIC) was utilised to programme a priority-based traffic signal controller for an emergency vehicle in this project. An emergency vehicle, such as an ambulance, might automatically cause the traffic light signal to change from red to green in order to clear its path. When the ambulance has completed crossing the road, the traffic light operation will return to normal using Radio Frequency (RF). The design was found to be capable of responding within a 55-meter range.

Sangamesh S B et. al [3] proposed an advanced Traffic signal control system for emergency vehicles, This project intends to manage emergency vehicles such as ambulances and fire engines in order to avoid traffic and arrive at their destination in time to save lives. The cloud is at the heart of this system architecture, which is built on the Internet of Things (IoT). The suggested

system uses real-time GPS to track the vehicle's location and upload it to the cloud, as well as smart traffic lights that are present along the vehicle's journey. The system keeps track of emergency vehicles so that they can pass through traffic with no or little delays, lowering the number of deaths on the way to the hospital and reducing the damage of property in the event of an accident.

Vidya R et al. [4] presented an intelligent traffic control system, stating, "The number of cars is slowly increasing day by day throughout the world." In India's biggest cities, the number of vehicles is likewise growing. As a result, massive traffic congestion develops, slowing traffic speeds, lengthening travel times, and increasing queuing. This causes drivers to become enraged and engage in road rage; these conditions may have an impact on the patients in the ambulance if they are not transported at a faster pace. As a result, residents of the metro area waste a significant amount of time. Timely arrival at the hospital due to traffic congestion.

M.S.D.SaiVarmaet. al [5] proposed an Intelligent traffic control system for emergency vehicle using rf technology,Their research attempts to create a traffic management system that detects emergency vehicles at traffic signals using RFID (Radio Frequency Identification) technology.The signal has an RF receiver, and the emergency vehicles have an RF transmitter, so the lanes can be freed based on the detection of RF in the signal. They explain that though RF's range is limited 10 metres, it can be extended utilising technologies like Zigbee.

However, the existing technologiesused RFID or BUZZERS to clear lanes for emergency vehicles which does not give the real time information about the vehicles. In order to overcome the limitations, there isa need to develop a system that traces the real time location of the vehicle and accordingly provide a vacant lane for the emergency vehicles. The technical advancements disclosed by the present invention overcomes the limitations and disadvantages of existing and convention systems and methods.Table 1 shows the summary of various existing work approaches, advantages and limitations.

III. ROPOSED MODEL

We will create a system in which the user (who may be a city resident with a health issue or an emergency vehicle representative) can pre-register and log in to the app with his vehicle information. Regular users and emergency vehicle representatives have unique options. When a normal user logs onto the app, he will be able to inform his emergency contacts. He can choose a neighbouring hospital and handle traffic from there.

When an emergency vehicle representative logsinto the app, he should choose the type of vehicle he is driving and his destination. From this point on, the programme behaves in the same way in both of the aforementioned scenarios.The app gives the user a route to their destination, then checks the GPS location of the devices against traffic signals along the route. If the user is close to a traffic signal, data such as user id, location, and nearby traffic signal ID (every traffic signal has a unique id) is sent to the database.

The traffic control room gets an upcoming emergency vehicle request and verifies the authenticity of the request by looking up the vehicle type using the registration number. The request is reported as spam if it is discovered to be fake. If the request is verified, a request for the arrival of an emergency vehicle is made to the destination in order to make the required preparations. The car is given the quickest route to its destination and is added to the traffic signal's emergency vehicle queue.

The system at the traffic light is searching the database for emergency cars. The vehicle data is added to the queue if there is an emergency. The queue comprises of all emergency vehicles that will pass the signal at the same time, so that priority may be given to the first vehicle to join the queue, and the lanes are freed appropriately, and the vehicle data is popped from the queue, otherwise the signal system will operate properly.We will reduce traffic congestion by turning the light red when no traffic is detected in a specific lane, allowing drivers in other lanes to go to their destinations without wasting time.

Table 1. Shows the Summary of literature survey

Ref.No	Methodology	Advantages	Limitations and Enhncements
[1]	Android application with GPS	Using technologies like GPS.	• The driver must manually control the system which might lead to further accidents. • We can automate the process of controlling of the traffic signal.
[2]	Peripheral Interface Controller (PIC)	Radio Frequency (RF) technology less chances to tamper	• The range of RFID is very less. • Range can be further increased by using technologies like Zigbee.
[3]	Real-time GPS	Using GPS and cloud technologies to control traffic.	• GPS module were used to get the user location. This can be expensive as there is requirement for a separate module in vehicle. • Using GPS which is directly built into mobile can be used.

[4]	Arduino UNO, IR sensors and LEDs	Stolen vehicles can easily be detected using RFID based vehicle positioning.	• All the vehicles should be equipped with RFID and the data of all the vehicles should be present at the traffic signal module. • Instead of placing RFID for all vehicles only emergency vehicles can have an RFID
[5]	RFID(Radio Frequency Identification)	RFID can be a cheaper solution and are not easy to tamper.	• The Range of RFID can be a problem. • Range can be further increased by using technologies like Zigbee.

To execute the aforementioned principle, we may use a PIR sensor to identify automobiles in the lane.

We proposea smart traffic monitoring system with ambulance safety in this article, in order to solve the above-mentioned concerns about emergency vehicles being stuck in traffic. The suggested design focuses on smart traffic monitoring as well as the Ambulance Safety feature, which manages traffic so that emergency vehicles such as ambulances do not become stopped in a congested crossroads zone.

A. Design Objectives

The following are some of the goals we want to achieve through our planned work:

- Ensures that the emergency vehicle's travel lane is clear so that it does not become stranded in a traffic bottleneck.
- Allows hospitals to check real-time information about emergency cases such that they can have prior arrangements
- Allows traffic control rooms to monitor real-time traffic.
- Decrease the waiting time of traffic by making empty lanes red.

B. Architecture

The architecture comprises ofthe ESP 8266 Wi-Fi Module, PIR Sensors, and LED lights are connected to the Arduino Mega microcontroller using jumping wires, and the code for its operation is written using the Arduino (IDE) application.

1. Arduino Mega 2560- The Arduino Mega 2560 is a microcontroller board. It can be programmed using the Arduino Software (IDE). This might be referred to as the brain of our planned project. Arduino connects all of the parts and sensors. The written code is also loaded into Arduino, allowing our code to work with physical components.
2. ESP8266 Wi-Fi MCU- The ESP8266 Wi-Fi MCU is used to detect the emergency vehicle near to it by posting HTTP requests to the server.
3. PIR Sensor- A PIR Sensor is a device that detects traffic in a specific lane. When there is no traffic in a lane, the traffic light becomes red.
4. RGB LED lights - The three signals of a traffic signal light are shown using RGB LED lights, with Green signifying "Go," Red signalling "Stop," and Yellow indicating "Ready."
5. Jumping wires (Male to Male & Male to Female)—Used to link each component from Arduino as well as other components.
6. Breadboard (one normal breadboard and four small breadboards)- According to the four-way junction, LEDs are put on four tiny breadboards. A regular breadboard is used to connect parts and provide power to various parts.
7. The architecture diagram in fig1 showhow all the above mentioned modules combine to make the disussed system.

C. Working

The proposed smart traffic management system is designed to work at intersections with three or more roads, each with two lanes. In the absence of an emergency vehicle, the system will check for empty lanes with green signals and turn them red; otherwise, it will work in a regular pattern, as illustrated in fig 3, with the signal turning green in a clockwise sequence for each of all roads for a predefined interval of time.

When an emergency vehicle notifies its details such as destination, Current location with the android application the application shares the details with the dashboard application present at the traffic control room which verifies the vehicle and accepts the request. Once the request is accepted the shortest route from the location of the emergency vehicle to the destination is shown on the application and the GPS data of the emergency vehicle is compared with the traffic signal location. Once the vehicle is near the traffic signal the emergency vehicle data is sent to the database which is monitored by the IoT module present at the Traffic signal as shown in figure 2. Once the traffic signal gets the vehicle's details the signal in the route is changed to green such that emergency vehicle can easily avoid traffic congestion.

The IoT module present at the traffic signal also monitors all the routes in the junction such that if any route is found to be empty the traffic signal at that particular route is changed to red such that waiting time at the traffic signal can be reduced significantly.

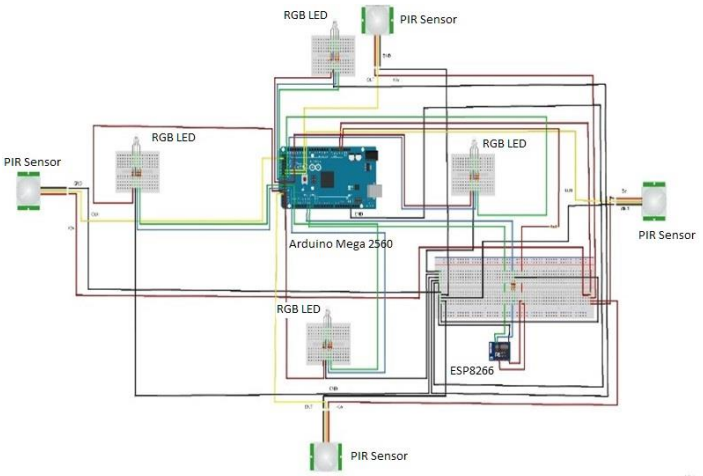


Fig.1 illustrates the schematic diagram of the components present in the system.

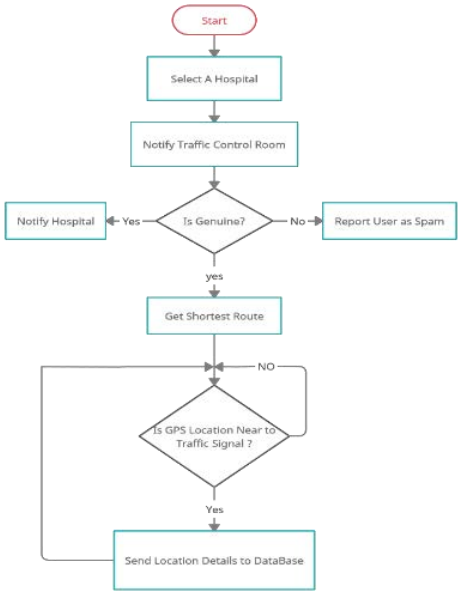


Fig.2 shows the working of the user application.

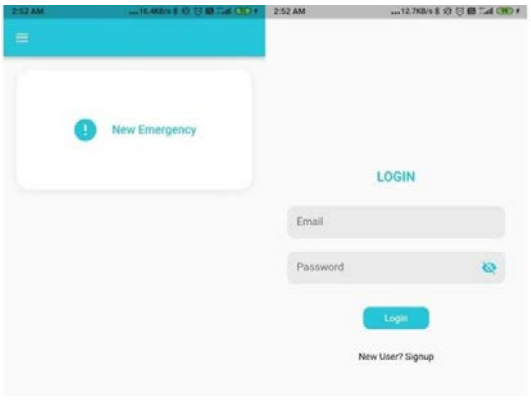


Fig.3 shows the working of the IoT Module at Traffic Signal

Working Flow for user application:

Step 1 Register the user from Android application.

Step 2 Approve user from Admin application.

Step 3 Raise New Emergency Request from application.

Step 4 Select a Hospital.

Step 5 Wait for the Approval from Admin.

Step 6 Travel in the route provided by the application.

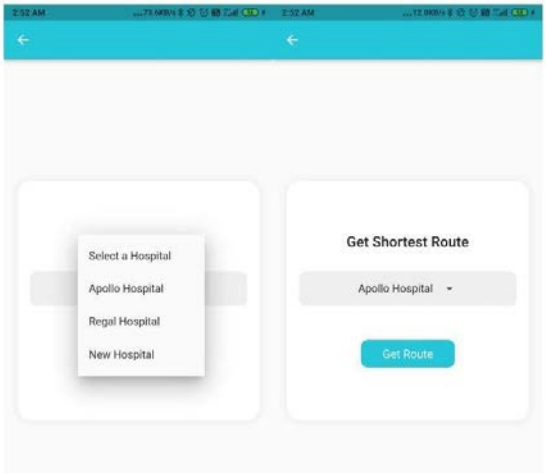


Fig.4 shows various components of android application

The detailed process on the systems working flow Is show in fig 3 and fig 2

IV. RESULTS

The following is a summary of the results gained after using the above-mentioned smart traffic management technique:
When an emergency vehicle uses the mobile app to notify the traffic control room and determine its destination. The user will be verified and the request will be accepted by the traffic control room using the dashboard web application. Once the request is granted, the app uses Dijkstra's algorithm to indicate the quickest path to the location, and the ambulance's GPS data is continually checked. As indicated in fig 2, if the vehicle is close to a traffic light, data is transmitted to the traffic signal, the vehicle data is added to the emergency queue, and the traffic signal on that route (Route 1) is changed to green, while the remaining traffic signals are changed to red. When the emergency vehicle departs that specific light, the data is plucked from the queue, and the traffic pattern resumes as usual. The Android application as shown in the fig 4 has a login page wherein user needs to login to enter the home screen. The home page has an new emergency option. Upon clicking on that button a page with near by hospitals is displayed. After selecting the hospital you will get the shortest route to the hospital and the traffic lanes are cleared accordingly as discussed in the above paragraph.
The login Screen as shown in the fig 6 uses firebase authentication for authenticating users. The nearest hospitals are stored in the firbasefirestore database and takes the user gps data to show the nearest hospitals.
The IOT Module present on various routes is shown in the fig 5.
Table 2 shows the comparison of the proposed system with other systems like RFID where in the ambulance lane gets cleard only when the ambulance reaches very close proximity to the traffic signal.

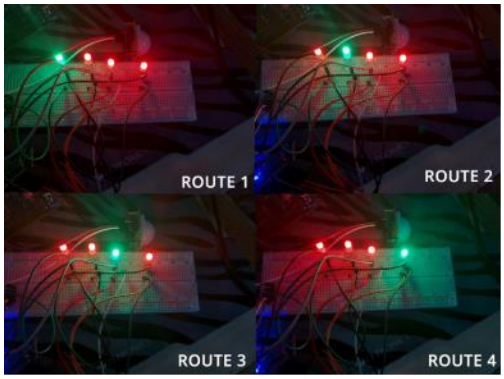


Fig 5 shows the working of the module at the traffic signal

Table 2 Shows the range comparison between different systems

Reference	Methods used	Range
[1]	Manual Clearing	0 meters
[2]	RFID	10-15 meters
	GPS based	100+ meters

V. CONCLUSION

In this proposed approach we use IoT and GPS to solve the problem of clearing the traffic for emergency vehicles and is compared with other systems like RFID. This system will be helpful for emergency vehicles for reaching their destinations without much hassle. This system makes use of GPS and the android app to get the exact location of the emergency vehicle and the website can help in detecting spam and monitoring of the emergency vehicles by the authorities such that they can have proper information about the situation prior to reaching the location. This system is accurate and user-friendly such that the end-user can easily understand the interface. This system can be extended by introducing GPS navigation with google maps and traffic signal status right from the app.

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3D Object Detection from Multi-View Images by Using OpenCV in Virtual Reality

Raghavendra Reddy[1]

Samuel Nitesh John[2]

Shashank MS[3]

Pradeep D[4]

VireshSharnappa Karadi [5]

[1]raghavendra.reddy@reva.edu.in

[2,3,4,5,]Niteshjsamuel@gmail.com

Shashumadikar1997@gmail.com

Pradeepkumar9051692@gmail.com

viresh.karadi.97@gmail.com

ABSTRACT

The current Scenario of the day-to-day development of the computer technology has led to the Rapid increase in the use of 3D Modelling based Computer Graphics or we can say virtual reality / Augmented reality,Computer Based Video Games and 3D Movies and many More Application. This concept creates the new world to human kind where everything can be built, make and used. There are several technologies available in the market which help to create the 3D object in the virtual world. Our concept is to detect the object in the virtual world and tell what that object refers too. We use the OpenCV for detecting the object and find it's coordinatedrespectively. The 3D data to given through the computer windowwhich is unity simulator.The accuracy of proposed system depends on frame (i.e., 10- 13, 17-20, 27- 30, 45- 70, in 0~0.3s, 0.1~0.4s, 0.8~1s, >1s time windows respectively). The accuracy even depends upon the distance away from the object (i.e., 60.4%, 73.9%, 89.3%, 95.2%, and 62.2% in >15, 15~10, 10~6, 6~0.5, <0.3 meters respectively). The result of the data been train are varieties that way the model will understand object in 3D world. The accuracy will be very bases on to the distance away from the object since it's 3D world the vast world will has to be consider. The future enhancement is vast by using this module example like identifying the 3D module of the human and find the its joints, arms, legs etc. to make the 3D module move on its own.

KEYWORDS: *object detection, 3D module, OpenCV, Unity 3D world, 3D object detection,virtual Reality, Augmented Reality*

1. INTRODUCTION

The innovation of neural network has inspired and made a way to solve many real time problems occurring naturally. every neutral network will self-learn and that helps to repair the picture. Neutral network will self-train and self-learn and run the image appearing, which helps extraction of features to the competition,So the effect and the effectiveness of their approachBased on the discussion above, this paper proposes a new template editing method that uses 2D images or is not as good as our approach. geometric shapes that incorporate the users' visualized thoughts in hand-drawn sketches or the visual feature of the 2D images selected by the users.[1]This is because the network performs multiple operations of max-pooling and down-sampling, which is originally constructed for abstraction task. The feature dimension is largely reduced. This results in the weak spatial description with drastically reduced spatial resolution. Convolutional Neural

Network cannot learn the s description of the structural relationship effectively. Moreover, due to the high and variable flight altitude and multi-angle rotate shooting of Unmanned Aerial Vehicle views, the ground objects with the same semantics are usually with small size, multiple scales, and high density spatially close to others, a cross-matching module is employed to avoid identity switch based on the proposed appearance model[12]..

Now days thevirtual Reality and Augmented Reality are major technology that are becoming the very popular to the user. The interface which it provides is fascinating and attractive to the users which will attract more user to use it and even in the game industry also those technology emerging. If the machine Learning to be combine this will create a vast door to new ideas for developer as well as gamers. The OpenCV is the image processing tool which will help us to achieve this goal frankly the data which are generated for the computer vision can be converted into the frame that way it will ease to identified the object.

The main contributions present in this paper are as follows:

- We have proposed a method where the 3D Object can be detected in the 3D or virtual world.
- We have designed a system for detecting objects which is represent in the 3D world to detect what the object represents and the give ability to move on its own.

To provide a system to communicate Unity window screen to OpenCV module to detect the object.

In the proposed system we will detect the 3D object in the 3D Environments using the OpenCV and CNN algorithm to detect the object in the 3D world which will be the Unity 3D the platform for the 3D modeling and object render. The current technology that works on the real-world object detection our system will detect the object in the 3D world the since the data are all related to real world, we can make use of the data to tell object in the 3D world.

This paper is structured in the following way: Section II outlines the associated studies in the field of activity detection research. Section III explains the new method's ultimate perspective. Section IV describes the implementation specifics, followed by Section V conclusion and future enhancement work.

2. LITERATURE SURVEY

Because of deep learning and Neural Network, a lot of progress has been made in machine vision. As a result, stronger and more reliable algorithms have emerged. In the field, certain algorithms were used to solve a wide variety of complicated computer vision problems. Some of the papers discussed here will help us to identify the research gaps.

Weizh NIEet. al.[10]proposed /suggested3d modelling in such a way by using Computer graphics and there by using Computer graphics he produced a 3d object representation in a surface the author make used of an special software to identify the open points in an 3d virtual space to form a mesh like structure. This collection of vertices is later grouped to form anobject. The important characteristics of this 3d objects are it can be either created automatically or manually by deconstruction of the mesh like structure. This are used in various fields like movies

Xinying wang et. al.[11]proposed /suggestedthe innovation of neural network has inspired and made a way to solve many real time problems occurring naturally. every neutral network will self-training and self-learning and that helps to repair the picture. Neutral network will self-train and self-learn and run the image appearing, which helps extraction of features to the competition Nevertheless.

Chengji Liu1et. al.[7]proposed /suggestedYOLO algorithm help to identify the object in the image first it will take photos of height and width after it will try to identify the object in the image the identified image will be marked out with the green box benchmark marked box take as an output layer help to identify the box, the preparedoutput will be the input image for pipeline to process image objects classification and determination of object location inside the box. The limitation is that it takes lot of time to train the module to the custom data.

Cong Tang et. al. [1]proposed /suggested suggest ImageNet Large scale recognition challenge (ILSVRC), Deformable part Model (DPM), the image it will categorize with region selection, future extraction, classification adopted object detected by DNN. DNN had a subnetwork location and subnetwork recognition, it will compute feature in CNN. Limitation is that the latency in the data which accrued.

Bernardo Augusto Godinho de Oliveiraet. al**.** [4] proposed/suggested The Neural networks are before due to more powerful GPUs, multicore CPUs and numerous algorithms have been introduced, reducing the complexity of time.ImageNet makes it possible to store pictures for machine learning. Because of this, it has become easy to form large and complex machine learning. The conventional neural networking algorithm assists in the identification of the object.

Table [1]shows the summary of various existing work approaches, advantages, limitations, and accuracy.

Few limitations are existing in the previous work. From the literature survey,few models even failed to perform predictions with good accuracies. Limitations towards the datasets even prevent getting good results quickly and precisely.

Table 1: Summary of the various papers studied under literature survey.

Ref No.	**Approach**	**Advantages**	**Limitations**	**Accuracy**
[10]	PointNet++ pattern for the shape of a 3D object, K-means Approchfor image processing.	It is able to detect missing functions.	harder to follow potentially useful impulses when your characters have a date with the next big event	83.2%
[6]	Hyperas, which chooses the best performing parameters	Due to 2D slice every corner of the 3-D image can be scanned	Fails while larger data.	79.2%
[11]	repairing 3D algorithm,	repaired region to maintain the detailed characteristics of its region through the local GAN and the global GAN	Not apply for the small holes but also large holes or even multiple holes.	88.5%
[3]	Deep Convolutional Neural Network technology for Object detection	Repair defective pixels in object detection.	It tracks down only with human beings.	94.2%
[5]	OpenCV: for Object detection and tracking	It will provide high-level precision with a less prominent image.	It is possible that the SSD will not generate high level accuracy with high level features.	85.3%

3. METHODOLOGY

The 3D object in the 3D world or the Virtual world are different compare to the real world. For system to understand the real-life object it uses the camera or pixel field to evaluate or process the data but it the 3D or virtual world is made of the

numbers and float values to make its environments look real, every position in 3D world are made of float numbers and pixel this way it become harder for system module to Understand. To this solution is to make the window vison to feed it to the OpenCV to Understand what that represent in the real word by object detection. The 3D scanned model delivered to OpenCV for image processing. OpenCV assists in detecting objects. OpenCV is a library of programming features aimed at real-time computation vision, OpenCV can be used for different programming languages to facilitate the development with python, Java, MATLAB, and openCV.js for the web platform. Captured 3D data first it will extraction of environment information feature it will comparison of observation The object will be observed if it does not exist it will take it as new observation, it will pass to change the route it will be updated in route.

Meanwhile the datasets to train the module can be the images of the real world pitchers the data can be normal process as the typical object detection work either it will be the YOLO modules or OpenCV to Train the disadvantage of the YOLO module which the training time will high which vary to 4 days to 15 days or moths according to the computation power there are the some light weight module which can be use or directly feeding the data to the R-NN or CNN which will reduce the computation power as well improve the performance[2]. The data will we feed will have the result on the terminal.

The data to which we can get from the Unity will every coordinate where the character move and interactive with the 3D world the only data we required to detect the object is the screen which the character can see in the 3D world. This way we can get the screen shot of the scene and give to module to tell the what is the character is seeing. The module will take the image and run the object detection module in it. and module return the value of array which contain the data label, confidence parameter, coordinates.

The Architecture of Proposed System:

The features used in the proposed model need to be pre-processed and divide into various stages. And each data has to come from the unity 3D world to process it. It has several steps from OpenCV to ML module to detect object.

1. Preprocessing unity 3D window

The object which are present in the 3D world are all the 3D objects the unity provides the custom-made 3D object which are available in Unity Assets store. After add the objects while running the computer vison will override with the character view in 3D world. This way we get the vision what the character seeing in the virtual world and then take those data and send it to the OpenCV to further processing as in figure [1].

2. OpenCV with object detection

The data Image which we get from the Unity will bel feed into the OpenCV dll module to detect the object which will effectually executed and print in the console the OpenCV will work as the computer vision to classified or cascade the object base on Haar cascade which is base on negative feeding and positive feeding to the module to cascade and train to detect which belong to the which class object label.

Deep neural networks, in particular, need a huge volume of training data. Furthermore, the images used in the training model make up a significant portion of the final model's output. It necessitates the collection of objective data of good quality. There are many datasets available for emotion recognition studies, ranging from a few thousand high-resolution photographs to hundreds of thousands of smaller images.

We train the network with GPU for 20 epochs to ensure that the precision converges to the optimal level. The more the data which feed the better the result will be to detect the object the improving the module will affect the result of the module. every second of time the module we feed the 20 frames to the module this we it can learn.

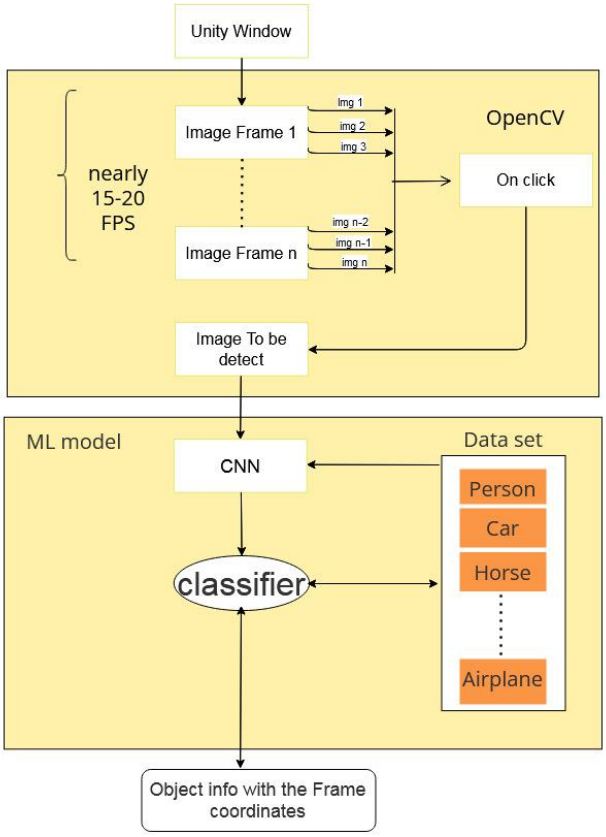

Figure 1: Simplified flow-chart for the entire system

Neural networks have proved to be inspiring in terms of computer vision tasks and performance as well. The performance of the module depend on the system GPU to train and evaluate the 3D object has been seen in the Unity Window and to be further processed to evaluate the data base on Image recognition to detect the object after the detecting the object we can train that object to move on the 3D module by using the MLAgent which is provided by the unity to train the object in the 3D environment according to conditions .

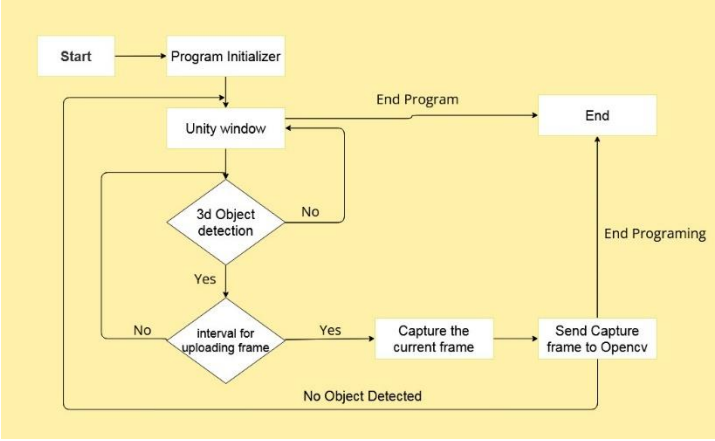

Figure 2: process of program structure

OpenCV,InitiallyOpenCV work on the Haar cascade where we feed the negative feedback as well as positive feedback to train the module to detect the object the data which is classified are will directly feed into the module to train then base on the it can differentiate as shown in the Figure [1], the object since we doing in the 3D world. the object that we detect

should be come from the 3D world and according to the screen it displays the value that it detects with the coordinate and confidence value. After detecting the object, we can make that object to move base on the ML agent which we train for basic move. Which work like chasing the target without hitting the wall which will done automatically to visualize the data which we train to move the object in the Unity world. The process of the module can be further hence by using the behavior module. Which will tell the module base on the label what to do walk move fly etc. this is the further enhancement.

Algorithms:

Algorithm forobject detection from a 3D world/virtual world.

Step 1: start the Unity Engine to enter the 3D world
Step 2: Search for the object to be detect
2.1align the window to the object
2.2take the screenshot
2.3send to the OpenCV module
Step 3: Feature Extraction from Images
3.1run the trained module
3.2detect the object from the frame
3.3revert back the value from the frame
3.4 display in the user screen with
Step 4: make the object move
4.1the object search for the target
4.2move till the target has achieved
Step 5: Final end the simulation

The movement of the object has been trained by the ML agent to find the target and move accordingly the Brain. The OpenCV not only detect the single object at a time but also multiple objects as well. The data which in feed to the OpenCV while training is multiple objects present in the images. The processstarts from the top layer which is unity window as shown in Figure [2] where we feed the unity window to our module where it detects the object if yes then take the screenshot of the frame and capture the frame to send to the OpenCV module to check if successfully detect the object, then exit the process.

4. RESULTS

The proposed system is to detect the object in 3D world but the Unity does not allow the python 2.7 above since because of the draw back we cannot directly implement the OpenCV rather we use the DLL for to do our work effectively the data which will the object can be detect are pretty good result like are 90 ~ 98 which is good interims of other algorithm or method like YOLO v3 or V4 etc. while making the object moving training we use the reinforcement learning to train the module which in below will be seen in Table[2]. While training we divide the module to train faster in train steps every step, we can see how many rewards it gets by mean reward.

Table 2: observations from the proposed method while training

Train Step	Step	Time Elapsed	Mean Reward
1	50000	110.343	0.549
2	100k	233.055	0.921
3	150k	352.577	0.971
4	200k	473.802	0.992
5	250k	599.837	0.996
6	300k	731.005	0.998
7	350k	124.877	0.766

8	400k	176.532	0.122
9	450k	234.865	0.654
10	500k	100.654	0.964
11	550k	444.821	0.992
12	600k	510.213	0.897
13	650k	123.999	0.156
14	700k	874.111	0.774
15	750k	735.032	0.987
16	800k	743.921	0.367

Figure 3: 3D object detection(Airplane)

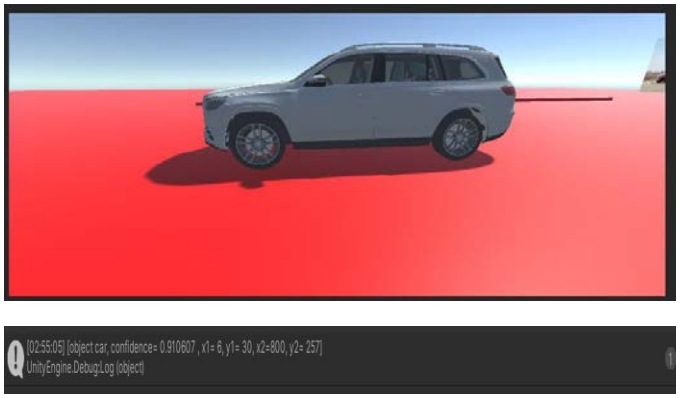

Figure 4: 3D object detection (car)

Figure 3,4 shows the snapshot of different object present in the 3D world and detect base on the screen which the character is seeing. The character can move freely without the restriction and make and just have to click on in the screen and the object can automatically detect the object and give the result in the console.

Model accuracies are calculated based on the probability of correctness and perfectness in the prediction of tasks assignedas the 3D object detect by the OpenCV module the movement of the object is done by the MLAgent which use the reinforcement learning which means base on its environment it moves according and find the target to get the reward as show in Figure[5] since there is reward there has to be punishment as we can say loss which is show in the Figure[6].

Since as we can see the previous the reward is less as the training improve reward accumulated and the loss or punishment will reduce. This way the MLagent can learn to move according the environment.

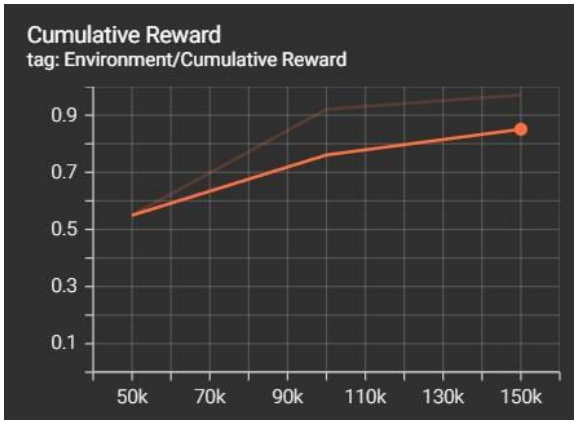

Figure5: Reward of the MLagent accumulated

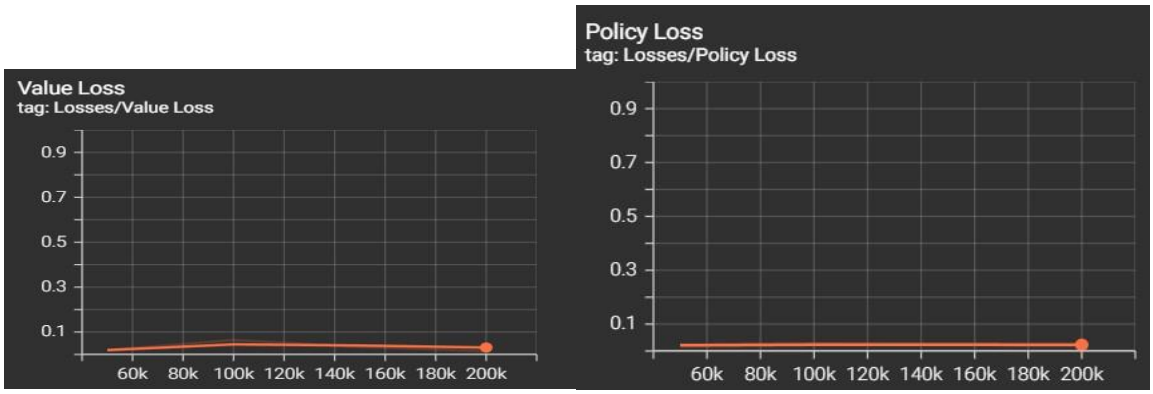

Figure 6: Loss of the MLagentdissipate

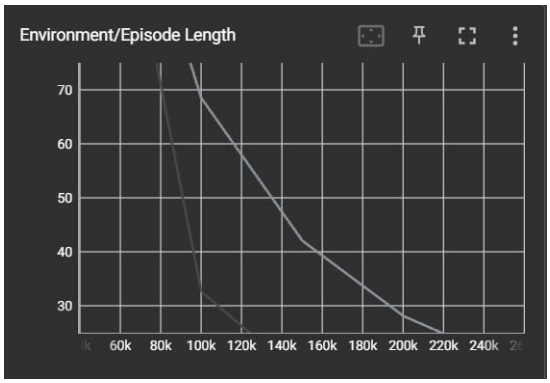

Figure 7: Final Model Accuracy and Losses at each Epoch

The final module which is already successfully train can able to detect the object and tell which categories it belongs as shown in the Figure[7] the more the training episode gets the better the module perfume in detecting the object around so

the down fall of the line shows that every episode the module reduces it false value.Table 2 shows Accuracy comparison between the proposed system and the existing system.

Table 2. Accuracy comparison between the proposed system and the existing system

Author	Methods used	Accuracy(%)
Weizh NIE [10]	PointNet++, K-means	83.2
llyassQuazzaniTaybi [6]	2D slice,CNN	79.2
Xinying wang [11]	3D-DCGAN	88.5
Xudong Li [3]	CNN	94.2
Chandan G [5]	OpenCV, Deep Learning	85.3
Proposed Method	OpenCV, unity3D	96

5. CONCLUSION& FUTURE ENHANCEMENT

Finally, we conclude that our model is able to detect the object and finally able to tell which that object represents in the 3D world the accrue of the module will around 88~94 which is pretty good compare to other module and the requirement for training the data set are also light wait which take less time to train the module. In upcoming world virtual reality will take on the world this way the module will use and can be improve in the other fields of vison to make the user experience high and effective.

immense of this module is limit less this module can be used in other way, like for Example like 3D human object detecting the object joints legs, arms, head we can make the module train to move on its own with action and movements on its own which will open the door for new world to be expectance even not only in the game field as well in the health and industry field the user experience will be greatly improve by 70% which is terrifying number this will also reduce the code to develop the object movement in the 3D world.

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AUTOMATIC NUMBER PLATE RECOGNITION IN KANNADA USING MACHINE LEARNING

[1] Shivaprasad S, [2]Sangram R N, [3] DR.sowmya S

Authors affiliation, [1]shivaprasadsnayak@gmail.com,[2]sangramrnadagoudar@gmail.com, [3]sowmyasudhan.s@reva.edu.in

Abstract.

The Detection of Kannada number plates is the most fascinating and research.

ANPR (Automatic Number Plate recognition) is a form of monitoring model that takes vehicle license number plates. Our main aim of this project is detecting kannada number plates/fonts. This paper introduces a model for number plate recognition, segmentation of character and detection of the characters in the Kannada License plate. Used OpenCV to identify number plates and OCR to detect and extract the characters and digits from the number plates. We analyze the working procedure of the ANPR by utilizing Open-CV and Python.

Optical character recognition (OCR) is executed using machine learning algorithms used for recognition of characters. The algorithm is simulated in python and their accuracy of detecting is evaluated on the pictures. We came to know that the model recognizes the kannada number license plate localization, identifies the letters and numbers.

For English language already ANPR system is available. For kannada language number plate we are proposing this model.

Keywords. ANPR, OpenCV, OCR.

1. INTRODUCTION

ANPR is a image pre-processing technique used for detecting stolen vehicle number plate.

ANPR is a process that contains the following stages:

1)Detecting the license plate from picture given as input.

2)Extract the numbers and letters from the license plate.

3) identifying extracted characters by applying Optical Character Recognition The localization of the license plate image is done after image pre-processing step. Plate localization is step for detecting a number plate. To capturing the picture of number plate looks easy but, it very tough to capture clear image due to various factors. Capturing

images of moving vehicle without missing any component of number plate is very difficult. Main factors like dynamic lighting conditions, shadows, and obstacles.

2. LITERATURSE SURVEY

1. Q. Wang et el…,"License plate recognition via convolutional neural networks" This paper portays about the license plate detection using an S.S.D model trained on license plate photos is used in this study. S.S.D. The SSD method makes use of a feed-forward CNN to create a fixed-size collection of bounding boxes and scores the existence of object class instances inside these boxes. The final detection is obtained after a non-maximum suppression (NMS) phase. A Deep neural network - CNN classifier is used for LP character recognition. The network performance was thoroughly analyzed and evaluated, yielding the best results.

2. R. R. Palekar et el…,"Real time license plate detection using openCV and tesseract" This paper portrays about license plate detection using Python IDE and openCV , pytesseract . The planned research is divided into many parts, the first of which is the collecting of photographs consisting of license plates. In the second step, several preprocessing methods.In the third step, the processed picture is passed into Tesseract OCR Machine, which uses a command-line interface to turn the detected license plate picture into text.
3. Quiros et el…," A kNN -based approach for the machine vision of character recognition of license plate numbers" This paper portays about KNN algorithm which is used for classification of characters from number plate. An image processing camera installed on a highway analyses the feed received capturing the images of vehicles along that highway. A contour within a number plate is computed as if they are valid characters along with their size and after that plates are segmented from detected contours. Each contour is classified using KNN algorithm. The KNN algorithm is trained using different set of training data which contains 36 characters comprising 26 alphabets and 10 numerical digits. The algorithm is tested on formerly segmented characters and compared with character recognition technique such as artificial neural networks.

4. Hendry Hendry , "Automatic License Plate Recognition Via SlidingWindow Darknet-Yolo Deep Learning", this project paper address the problem of car license plate detection using a You Only Look Once (YOLO)-darknet deep learning framework. In this paper, we use YOLO's 7 convolutional layers to detect a single class. The detection method is a sliding-window process. The object is to recognize Taiwan's car license plates.

5. V Gnanaprakash et el…," Automatic number plate recognition using deep learning", this paper tells about This paper suggests an automated vehicle tracking system for the fast moving vehicles with the help of the surveillance cameras on the roadside. The process of getting CCTV footage in the real time background is

very tedious process. To cater to this problem, an efficient deep learning model such as You Only Look Once (YOLO) is used for object detection.

3. RELATED WORK

In this paper we proposed the model for detecting the vehicles license plate in kannada , the image taken through the camera will be taken as input , for the input image we apply image preprocessing techniques like gray-scaling, noise removal after that plate localization and character segment and detection contained in the number plate. For real time application a license board detection requires a video camera that takes picture of vehicles from rear or front for the present work. The images of different vehicles have been captured manually from the camera and feed to the model.

4. METHODOLOGY

Automatic license plate recognition in kannada (anpr) contain the following steps:

Step 1: Capturing vehicle number plate by using camera.

In this step we have take pictures through digital camera. Which contain license plate.

Step 2: Conversion of the number plate image to grayscale image.

After taking the picture, we have to feed that photo types image pre-processing techniques, such as image brightness correction, image restoration, in the final step we will convert image into grayscale image. We use openCV library in this preprocessing process.

Step 3: Detection and localization a license plate.

In this step, plate localization in the given image taken place, we use canny algorithm for image plate(edge) detection. After that contour detection and apply mask around the plate for accurate number plate localization.

Step 4: extracted characters and recognizing characters.

In this step characters from image will be extracted using OCR and finally detected characters will go through CNN algorithm for identification then the output will be shown in the end.

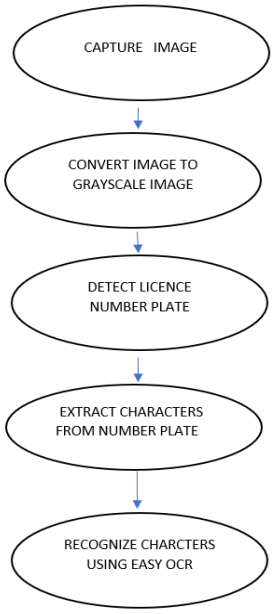

Fig 1- View for the proposed model

5. EXPERIMENTAL RESULTS

1. Image taken through the digital camera

Fig .2- Images captured from the camera

2. Image gone through the image preprocessing techniques, in the final step converted to grayscale image as shown in the fig(3)

Fig .3- Gray Scale images

3. Applying canny algorithm for number plate edge localization .

Fig. 4- Apply filter find edges for loacalization

4. contour detection and applying mask around the detected number plate for only number plate detection. As shown in below figures fig(5)&fig(6).

Fig .5– mask around the number plate

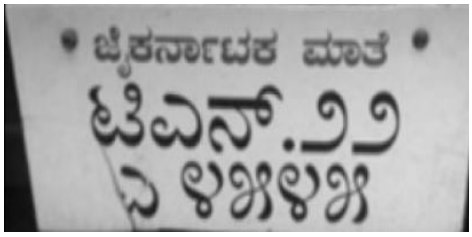

Fig .6– Detection of number plate

5. Applying OCR to Exatrct the characters from image and showing the results.

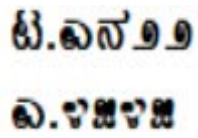

Fig 6 – Extracted characters from plate

6. CONCLUSION AND FUTURE WORK

The automatic recognition of kannada license plate is proposed. In this model we use different types of picture preprocessing methods for detecting number plate within the dataset present inside computer. The model simulated output appears that the model localizes and recognizing the vehicles kannada number plate in various light states. The proposed model works very well, despite that, there are some improvements are required. The digital camera utilized in this working model is reactive to shaking. The model accurate rate will be increased if we use more resolution camera. This model can also be used for detecting other than license plate and with some modifications can be used for blind person help.

7. FUTURE WORK

In the future development of projects, we can make the model to detect text to audio conversion. And it will be helpful for blind persons.

8. ACKNOWLEDGMENT

The accomplishment of any given task is never the result of a single person's efforts. group of people who play an important role in seeing a project through to completion. Our happiness at having completed our project work would be incomplete if we didn't thank everyone who assisted us along the way. We would like to show our gratitude to our REVA University for providing us with resources we needed to achieve our most cherished goal. We would glad to express our gratitude to our Hon'ble Chancellor, Dr. P. Shyama Raju, for his unshakable support for students wishing to present innovative ideas. We owe a huge respect and gratitude to our renowned Director, for creating a welcoming environment and encouraging each student's development and creativity. We would like to

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Music Genre Classification using Machine Learning

Jeffery Ho Kin Pou
School of CSE
REVA University
Bengaluru, India
r18cs164@cit.reva.edu.in

H Keshav Rao
School of CSE
REVA University
Bengaluru, India
r18cs156@cit.reva.edu.in

Geetansh Bhambhani
School of CSE
REVA University
Bengaluru, India
r18cs145@cit.reva.edu.in

Joel Joseph
School of CSE
REVA University
Bengaluru, India
r18cs165@cit.reva.edu.in

Suriya Prakash J
Asst. Prof., School of CSE
REVA University
Bengaluru, India
suriya.prakashj@reva.edu.in

***Abstract*— A 'music genre' is a classification system, that distinguishes parts of a music line or the entire music into some music form or music style. We are able to categorize music into various genres in several ways, like religious music and pop music, secular music and classical music. The amount of data available to us is increasing rapidly, making it infeasible for manual curation. In this work, we apply simple and basic machine learning algorithms namely Logistic Regression, K-Nearest Neighbor, Random Forest, Support Vector Machine and Artificial Neural Network, along with dimensionality reduction techniques namely, PCA, KPCA and LDA, on the GTZAN dataset. Further, we compared their accuracies and found that the combination model of KNN with PCA provides the highest accuracy of 77.41% among the compared models.**

Keywords*— *Music genre; Machine learning; Classification algorithms; KNN; Principal component analysis; GTZAN dataset.

I. INTRODUCTION

A genre is a crucial feature of any tune or audio that can advise or recommend users to their preferred choice of music. Most music lovers and fanatics usually create playlists established on distinct genres and forms of music, leading to probable applications such as management and playlist recommendation systems. Further, we see that the increment of music databases, nowadays which are online, and interactive applications for users opened up prospective, effective and automatic tools that are being used for classification of music, thereby becoming an essential issue.

The inescapable utilization of the World Wide Web and Internet has achieved tremendous swaps in the music business also causing a wide range of progress. Instances of these turn of events incorporate the far and wide utilization of online music tuning in, music copyright issues, grouping and classifying audio types and several other music proposals. As with CDs and DVDs and music tapes coming to an end as the main wellspring of music, the rise of web has a consequent and remarkable command over the progression of data, i.e., retrieval from the web to each and every being on the planet associated to this system. People now listen to audio and music any time they want and from wherever they want, thanks to the expansion of music broadcast platforms, and they can access thousands of songs through numerous listening platforms. The outcome is a massive collection and assortment of tunes, sound documents, stacked up indiscriminately in different files and folders, making it difficult for any person to manage and keep up with the genre of every single tune and orchestrate them similarly. Segregating and classifying sound tracks and tunes by labeling them to the fitting kind is the most legitimate approach to make in order to oversee and control sound records and audio files that are in such massive numbers.

Genre classification can be considered a way to categorize music by sighting it as to a common or similar custom or some different accord. An important note about this is that there is no straightforward definition of what a genre should sound like. There is no correct or incorrect way in saying that a song should be classified a certain way, rather it is a person's opinion of what a song makes the person feel and how they relate to it. Nevertheless, there should be some sort of regularity and uniformity when it comes to what a genre sounds like.

Computerized classification labeling that utilizes AI based models have unlocked additional opportunities in this dynamic area of research with favorable outcomes. Various models using neural networks [7] have been implemented along with combinations of other models, to predict the genre with greater accuracies. Likewise complex models such as Double Weighted KNN [6], hybrid models of LSTM and SVM [3] have also been experimented with, in order to further the study in this area.

In this study, music genre classification system is performed based on various machine learning techniques. We aim to perform music genre classification on the GTZAN dataset, by using simple and basic classification algorithms: Logistic Regression and K-Nearest Neighbor and Random Forest and Support Vector Machine and Artificial Neural Networks. Before actually performing the classification, we also make use of dimensionality reduction by using and comparing 3 different techniques: Principal Component Analysis and Linear Discriminant Analysis and Kernel Principal Component Principal Analysis.

II. Literature Survey

In the very beginning, music categorization and genre classification were done manually by humans. People who studied this field, would first listen to the audio or music and then categorize them into a particular genre based on past similar music form or style. But since the boom of big data, the amount of data available to us is increasing rapidly, making it infeasible for manual curation. Despite previous studies and research on classifying music genres using machine learning models, there is obviously still room for exploring and creating complex models.

The most influential work using machine learning technique for classifying music genres was done by Tzanetakis and Cook [1] . Archit Rathore and Margaux Dorido [2] proposed several classification models for the GTZAN dataset. The GTZAN dataset is considered as a standard for genre classification. The authors obtained the best accuracy by using SVM with Polynomial kernel.

Prasenjeet Fulzele et al. [3] proposed a model using combination of LSTM and SVM. This paper proposes a model that is implemented in 2 sections. First, properly training both the classifiers individually. Second, combining both the models by using the sum rule, i.e., to calculate the separate posterior probabilities of both models and then adding them to retrieve a combined final result. Ahmet Elbir et al. [4] extracted a total of six features through digital signal processing and training a CNN model. Five different machine learning algorithms were used: KNN, SVM, Naïve Bayes, Decision Tree and Random Forest classifier. Gabriel Gessle et al. [5] performed analysis using a comparison between CNN and LSTM. In this work, two datasets were used namely GTZAN and FMA datasets. Both the datasets were divided into training and validation sets. Using both CNN and LSTM on both the datasets, results were obtained. In 2019, Meimei Wu and Xingli Liu [6], proposed a KNN algorithm which was the doubled weighted version of the simple KNN algorithm on the GTZAN dataset.

Nikki Pelchat et al.[7] used artificial neural networks for genre classification. In their paper, they collected songs, converted them into Short-time segments and then represented the time segments in the form of spectrogram images. These images were further given as input to the CNN model. Their CNN model had multiple convolutional layers and a connected layer. They implemented SoftMax function for genre probability.

A web-based analysis was proposed by Jamie Ramirez Castillo and M. Julia Flores [8]. This paper presents an application that fetches music and songs from online platform like YouTube and segregates them into belonging genres. Their approach uses different machine learning classifiers namely, Naïve Bayes, and Recurrent Neural Networks, Feed-forward and SVM. These models were trained as multi-class classification algorithm structure. Akash Poornasingh and Dylan Dhoray [9] used PCA to accumulate the timbral qualities in order to classify the music to their genres.

III. DATA

GTZAN was initially proposed by G. Tzanetakis and is still one of the most popular music record dataset used for genre classification. The data files were cumulated in around 2000-2001, from numerous sources like CDs, DVDs, radios and microphone recordings. It contains 1000 music track records which are 30-seconds in length, with 22050 Hz sampling frequency and are 16 bits. There are a total of 9991 rows (records) with 59 columns (features/attributes). Genres in the GTZAN are blues, classical, disco, etc. All of these genres have 100 music track record. Each audio track is studied as a .wav format.

A. Preprocessing

Different preprocessing methods are applied on the dataset prior to preparing our model. This preprocessing on the dataset is done to make the information more viable with the models and to make our picked dataset heartier.

Features in most datasets follow different scaling. As an outcome, it makes it difficult for the classifying model to converge faster and the time for computation of training increases and it consequently results are not favorable. To overcome this issue, we implement standardization to bring down all the features to a standard scale without changing any variability in the range of the values. We do this by rescaling all the attributes such that their mean value is '0' and the variance value is '1'.

Standardization:

$$z = \frac{x-\mu}{\sigma}$$

with mean:

$$\mu = \frac{1}{N}\sum_{i=1}^{N}(x_i)$$

and standard deviation:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i-\mu)^2}$$

Fig. 1 Formula for Standardization, mean and variance

We use StandardScaler() method from sklearn.preprocessing to achieve this task. In this way, to accomplish most extreme efficiency, we need to preprocess the information before actually classifying the dataset.

IV. METHODOLOGY

In this study, we perform the genre classification on the GTZAN dataset, by using five basic classification algorithms: Logistic Regression, Random Forest, KNN, SVM and Artificial Neural Networks. Before the actual classification, we will also perform dimensionality reduction by using three different techniques: PCA, K-PCA and LDA. Each of the classification algorithm is used along with all the three dimensionality reduction techniques and as a result we obtain a total of 15 different combinations of classification models.

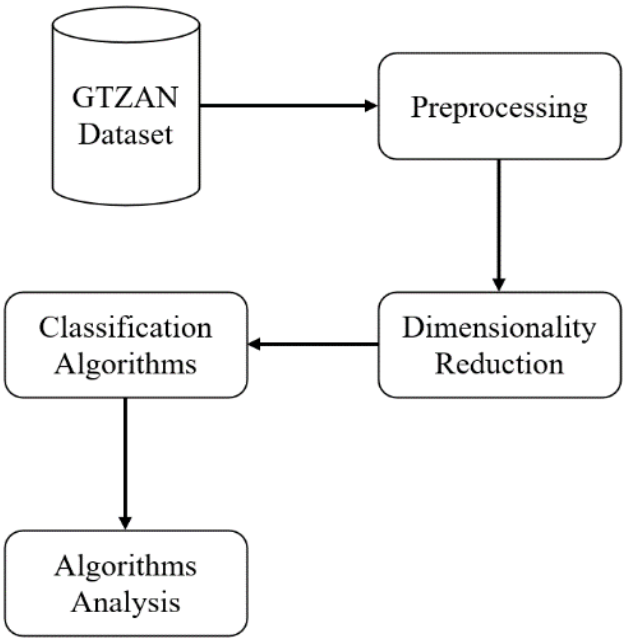

Fig. 2 System Flow Diagram

A. *Machine Learning Classification Algorithms*

As mentioned before, in this part we make use of five different learning algorithms for classification.

- **Logistic Regression:** [14] a process of demonstrating or illustrating the likelihood of distinct outcomes when we provide an input. Often logistic regression works as a binary outcome; anything that takes two values such as 0/1, true/false, etc. Though, this algorithm is mostly used for two class classification, it can also be used for datasets with multiple classes.
- **Random Forest:** [15] Another machine learning algorithms for classification and regression is Random Forest, which is a supervised learning technique. It works by basically building trees on distinct samples and takes their bulk vote for classification and average value in case of regression.
- **K-Nearest Neighbor:** a supervised learning method [6][16][17], also used for classifying data. The input to this algorithm is a variable number of closest training points in a dataset. The output is a label integration or belonging. A data point is categorized based on a majority vote of its

neighboring data points, with the object being assigned to the label which is nearest to or most common among its 'k' nearest datapoints.

- **Support Vector Machine:** another supervised classification algorithm [3][18], widely used for classification. The objective of SVM algorithm is to calculate a hyperplane in some n-dimensional space which classifies the training examples clearly in a distinct manner. This hyperplane is constructed by optimization of the boundary surfaces of the labels being separated.
- **Artificial Neural Networks:** ANN or simply Neural Networks [7][19] are a series of algorithms that attempt to emulate the human mind and track down the relationship between the sets of data. An Artificial Neural Network has many layers. Each of these layers perform a specific task, and as the intricacy of the model builds up, the quantity of layers consequently increases. This is a reason for it to be also called as multi-layer perceptron.

B. *Dimentionality Reduction Techniques*

As the model has 59 features, there is obviously a need for the application of dimensionality reduction on the dataset. Some features contribute highly towards the dataset, whereas other features only have very little effect on the entire dataset. We need to capture those features that contribute the highest information to the dataset when we train and test the classification models.

We do this dimensionality reduction by using three techniques:

- **Principal Component Analysis:** PCA[10][11] is an unsupervised statistical procedure[9] that sums up the data content in an enormous information table to a more modest arrangement that can be all the more effectively imagined and analyzed. In simple terms, it will transform a substantial set of variables into a more compact and smaller set, but still containing most of the information from the original set. Hence, reducing the number of attributes/features of the dataset, while preserving as much information as possible. It constructs the principal components in a way that the first component holds the largest variance in the dataset. The next component is then constructed in the same way, but on a condition that it should not be correlated with the first one and should account for the next highest variance. After computing all principal components, it further calculates the covariance matrix and estimates the values of eigen vectors. Finally, we can rank the eigen vectors in order of their eigen values, highest to lowest to get the principal components in order of their significance towards the dataset.
- **Linear Discriminant Analysis:** LDA (or Normal Discriminant Function or Discriminant Function Analysis) is a supervised technique which is widely used for dimensionality reduction, in most of the classification problems. It works by modelling differences in groups or by segregating two or more classes. LDA projects the higher dimension space into a lower dimension space. LDA is likewise firmly related to PCA in that both search for the combinations in a linear fashion of the variables best explaining the data.
- **Kernel Principal Component Analysis:** KPCA is similar[13] to and an extension of the PCA technique and which is a non-linear dimensionality reduction technique. KPCA works by using the kernel method. KPCA technique relies on the assumption that many datasets, which are not linearly separable, can be made so by projecting them onto some other higher dimensional space. The additional dimensions are simply basic arithmetic operations, which are performed on the

unchanged original dimensions. Therefore, we project our dataset onto some higher dimensional space and hence they become linearly separable. Finally, we can perform reduction by applying PCA on this new dataset.

V. EXPERIMENTAL RESULTS

After creating all 15 different combination classification models, the following results were obtained. In this section we compare all the results and evaluate the accuracy of each model. The accuracy values are provided in Table. 1.

Table. 1 Classification results by accuracy

Accuracy (%)			
Classification Algorithm	**Dimensionality Reduction Technique**		
	PCA	***LDA***	***KPCA***
Logistic Regression	53.28	53.32	67.56
Random Forest	77.41	75.14	76.97
KNN	69.20	69.96	72.07
Support Vector Machine	69.40	69.26	74.17
Artificial Neural Network	73.50	65.29	75.17

From the Table. 1, we see that the accuracy achieved by the KNN classification algorithm used along with Principal Component Analysis (PCA) was highest. The value of 'k', i.e., number of nearest neighbors used was 3. This value was changed and the model was evaluated by giving values as 5 and 7, but the accuracy value was decreased. A possible explanation could be that, since more data points were considered, the distribution would have affected the calculation of distances between the data points. For PCA, the optimal number of principal components was 10. We constructed a scree plot to analyze and estimate this number.

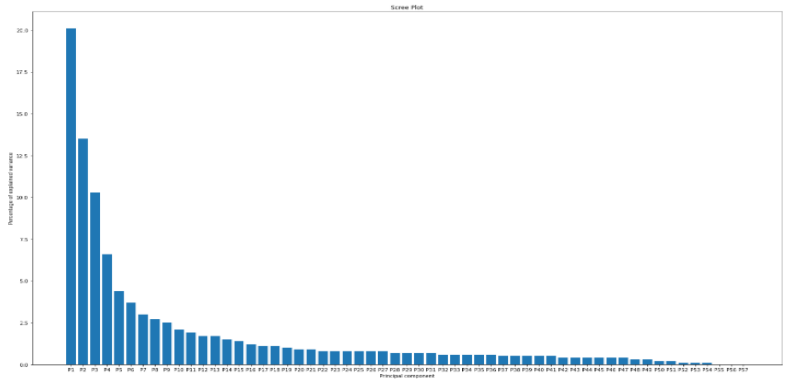

Fig. 3 Scree plot to estimate the optimum number of components for PCA

VI. Conclusion

This study and paper aim to categorize music or music clips based on their genre or form, using simple machine learning algorithms and few dimensionality reduction techniques. Our study has been conducted over two sections. Firstly, reducing the number of features using dimensionality reduction techniques: PCA, LDA and KPCA. Next, we classify the reduced dataset using 5 different classification algorithms: Logistic Regression, Random Forest, KNN, SVM and Artificial Neural Network. According to the result summarized in the previous section, KNN used along with PCA achieved a better accuracy than other models. Future works can include research and study relating to higher dimensional extraction of dataset features and several other complex deep learning models.

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NETWORK ON CHIP: AN OVERVIEW ANDREVIEW Of LITERATURE

[1]Binayakanta Senapati School of CSE
REVA UNIVERSITY
Bengaluru, India binayks.binay07@gmail.com

[1]Himashree M School of CSE
REVA UNIVERSITY
Bengaluru, India himashreem07@gmail.com

[1]Chanukya Surya School of CSE REVA UNIVERSITY
Bengaluru, India
chanukyasurya@gmail.com

[1]Dikshitha AV School of CSE
REVA UNIVERSITY
Bengaluru, India dikshithaav06@gmail.com

[2]Dr. Sanju V School of CSE
REVA UNIVERSITY
Bengaluru, India sanju.v@reva.edu.in

Abstract.

NoC (Network On Chip) is a new developing technology that is centered on a chip-based interconnection network. This approach was developed to address the traditional SoC (System On Chip)'s inefficiency as the compute capacity required to perform various tasks rose gradually over time. This article is a condensed version of what we learned from numerous research papers and other reliable sources while doing in-depth study on the intriguing idea of Network-On-Chip (NoC).

Keywords—Network-On-Chip (NoC), System On Chip (SoC), NoC Topologies, RiCoBiT, Multiprocessor System On Chip (MPSoCs)

I. INTRODUCTION

We are right now living in that specific period of a time in which new age state of the art advancements are being created pretty much consistently across the world. SoC (System on Chip) is an innovation that ignited this pattern by joining all the equipment elements of a common place PC framework into a minuscule gadget known as an Integrated Circuit (IC) or a chip. For correspondence and information move between many a circuit, SoC utilizes Common Bus Architecture. Nonetheless, as the requirement for handling abilities developed pair with the quantity of cycles to be done on a chip, SoC arrived at its scaling limit. It demonstrated wasteful on the grounds that as the quantity of cycles to be done on the gadget rose, so did the vital voltage and power dispersal. Nonetheless, on the grounds that the chip's power utilization is controlled, this can risk the capacity and working of circuit. Because of this control, the chip has acquired shortcoming as postponement. To resolve this multitude of issues, a novel thought known as NoC (Network-On-Chip) has been proposed, in which a solitary hub in the circuit can associate straightforwardly and proficiently with every hub in the circuit. NoC is a modified version of SoC that uses a concept called global wiring to replace the common bus design of SoC. Communication between the nodes can be made immediately via these cables. NoC architecture may be categorized into several topologies based on the number of connections established and the form in which wires are linked, with each topology having its own set of pros and cons. Furthermore, information about NoC is briefly discussed in the following sections.

II. NETWORK-ON-CHIP (NOC)

NoC or Network-On-Chip is an organization-based intercommunication subsystem on an incorporated circuit, for the most part between various modules/nodes in a System on chip (SoC). Or on the other hand in basic words, Network-On-Chip (NoC) is a plot for getting sorted out correspondence between working modules or hubs present on a similar chip. This innovation applies the hypothesis and techniques in viewof the ideas of PC organizations to on chip correspondence and brings regular upgrades over the transport and other existing correspondence designs. Because of its design, it groups a significant benefit over other existing structures as far as overseeing power proficiency and electrical properties on chip.

A. WHY NOC?

The network on the chip is a technology which is based on router-packet switching networks between the System On Chip (SoC) modules. For the most part, the wires involve a lot of the region of the chip, and this is where NoC comes into picture. SoCs with NoC interconnect textures can achievehigher working frequencies since NoC innovation lessens the equipment expected for exchanging and steering undertakings.

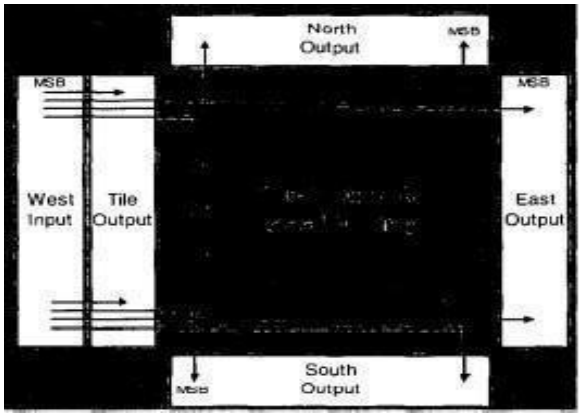
B. BENEFITS OF NOC ARCHITECTURE

- Independent layer implementation and optimization: Layers should be carried out and enhanced. The divisionof the current issues to more modest issues with a distinct normal connection is a typical way to deal with basically the difficulties of complex designing.

- Simplified application customization:
  Commands which we give and the reactions which we get are essentially bundles sent by the network at the transport layer, and anything which is done at the network layer ought to help the transport of these packets. When contrasted with a customary interconnect,this works on the customization and execution of the interconnect for a specific application.

- Supports multiple topologies and options for differentparts of the network:
  NoC interconnect allows for the use of various optimizations and topologies across different modulesof the network.

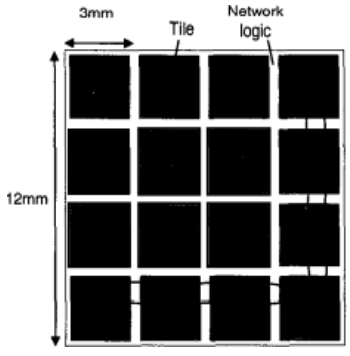
- Simplified feature development, interface interoperability, and scalability:
  Interconnects should be upgraded to support future features such as new types of transactions and burst modes. Adding new features to a connection that is organized into layers requires only minor adjustments to the layer that supports the feature. Similarly, if a network infrastructure architecture or transportation technologies outperforms the original, the old network can be replaced with no need for a network design. Traditional interconnects struggle to reach the requisite performance in systems with hundreds of masters and slaves. Interconnects built for dozens of masters and slaves are incapable of supporting the numerous numbers of parts required by today's systems. It is relatively simple to partition the network into subnetworks using NoC connection, with bridges, pipeline stages, and clock-crossing logic as needed across the whole network.



III. EXAMPLE ON CHIP INTERCONNECTION

Let us consider an example to understand what exactly an on chip-interconnection is. Let us consider a chip(12mm*12mm) which is further partitioned into16(3mm*3mm) tiles as shown in Figure1. Each tile in the above fig. holds all the required client logic. Every tile uses these client logic peripherals to connect with other tiles, and each tile has a network interface that comprises an input port for inserting a packet to be transferred to another tile and an output port for receiving packet data from another tile. A 256-bit data field is present on both the ports.

Figure1: Network logic and partitioning the chip into module tiles



IV. ROUTER ARCHITECTURE

So, in this case, the router is a device that is in charge of passing data packets in the proper direction. Each tile's router is made up of five input and output controllers (i.e., each controller for each direction as shown in the Figure2)

In Figure2, the west input controller is connected to four other output controllers, which means that the tile input and output controllers are present at the western-side of the tile. Here the network uses a simple virtual channel flow control. Each input channel contains a buffer space and an input state logic for every virtual channel to receive the incoming data packets. And each output port provides a one stage buffer to every input port connection so that the outing going data packet links with the input port of the next tile. The interesting fact is that routers, along with a few upper layer wires, take up only 6.6 percent of tile region. Because of the NoC's benefits, the network controls both pre-scheduled and dynamic load very efficiently.

Figure2: Connections from the west input to the output controllers

V. CHALLENGES IN ARCHITECTURE AND DESIGN

When compared to SoC, even though the pins and wires are more abundant in on-chip network, since all of them are organized, the on-chip interconnection network offers a massive advantage over SoC to invent new technological aspects and optimization techniques on chip. Because wires and pins are much more abundantly available in on-chip networks, each tile can be connected to every other tile present in the network and that too in more efficient and faster way when compared to SoC, which is very much pin, and wire limited. For example, a tile i has a bundle of N wires that must be properly linked to a tile j. The local logical computer supervises these wires to see if their state changes. So, depending on the shape in which the wires are connected, and the no. of connections made, NoC's connections are classified into various topologies where few topologies provide more advantage over other topologies depending upon the no. of connections made. Much of the advantage of NoC comes from the regular and structured wiring. So, the well-organized wires and electrical parameters enable us to design a very efficient and high-performance computing chip.

VI. SYSTEM ON CHIP (SOC)

With the intricacy of the inserted framework expanding what's more, the extent of current silicon innovation spreading, there is a development towards independent frameworks executed on one chip just, characterized as an On-Chip-System. A SoC is an incorporated circuit with a solitary chip, that houses PC peripherals like the CPU (through a chip or microcontroller), memory, input/yield ports, and auxiliary stockpiling on a solitary substrate like silicon. Since all parts are housed on a solitary surface, SoCs consume least measure of force and take up less space than multi-chip frameworks. SoCs are most generally found in the cell phone industry. Due to the utilization of SoCs, makers of such gadgets are presently ready to observe the littlest item that gives satisfactory execution. SoCs likewise affected installed frameworks by preparing for single-board PCs that are a lot more modest and compact. ARM is upheld by most of the SoCs available today. Drafting the NoC with all its boundaries for each SoC requires the utilization of computerized configuration apparatuses. Such apparatuses should be based on specific plan processes and integrate the calculations which are improved into their system. Bolotin et al. [6] propose a plan approach for SoCs that incorporates the three stages recorded beneath:

- First, determine the target SoC's QoS needs.
- Second, the network is customized through propermodule placement and a static, shortest path routing algorithm with a minimal gate-count cost.
- Finally, perform network load balancing byallocating adequate link capacity to reduce congestion and ensure that each communication flow's multi-class QoS requirements are met.

Now we'll describe about design phases, routing, and resource allocation:

A. ROUTING:

Shorter pathways in a preset topology can result in an unbalanced load distribution between links. The energy gain of routing on the shortest paths, for starters, is compelling. Second, pooling traffic across a smaller number of excessive-capacity lines reduces latencies compared to routing traffic over shorter channels. A number of routes with the same length and overall capacity Some links with a high degree of link sharing can eliminate the need for additional routers and links, thereby reducing chip space and power consumption. As a result, the shortest path routing scheme with path aggregation is very appealing. Practical NoC topologies become uneven meshes due to the variety in shape and size of modules in VLSI formats, as well as the requirement to physically segregate modules and NoC infrastructural facilities in the SoC environment. For messy meshes, there have been two simple alternate solution routing techniques:

a. source routing (SR), where a sequence of routing instructions is carried by packets
b. routing distribution (DR), where each intermediate router looks for the destination

Routing tables are typically used heavily by both SR and DR (RT). DR tables are found in each router. They contain the output port values and are labelled with the packet's destination address. Each source has its own set of SR tables.

CAPACITY ALLOCATION:

Capacity allocation is a major area of study in SoC. For broad flow distributions, variable connection capacity, and numerous virtual channels, a novel wormhole network analysis methodology is being developed. An evaluation is used as a foundational component in a recursive optimization process that gradually reduces connection capacity until latency requirements are met. For each link, the minimal number of cables as well as the minimum speed for a certain number of cable connections are chosen. Because of the speed, the designer can lower the voltage of any router, lowering the static and dynamic power dissipation.

VII. DIFFERENCE BETWEEN NOC AND SOC

SoC is a single chip that comprises a collection of unique and interconnected devices that can be used to solve a wide range of problems. The term "Network On Chip" refers to a technology that establishes connections between components within a SoC or processor to ensure maximum data transmission speeds while reducing the number of physical connections required. A network switch-based network between SoC modules could make up the network on a chip. NoC technology minimizes the required hardware for performing operations and switching, allowing SoCs with NoC communication networks to access high-performance speeds. In NOC, communication is formed via a touch of a packet. The delivery of packets by most hops is completed by switching. It generally follows the protocol stack's reinforced structure. A Network Interface and Router Processing functions are included in Network on Chip.

VIII. PACKET SWITCHING AND ARCHITECTURE

Switching describes how messages travel along their path. Packet switching is a network switching mechanism that does not require a connection. Packet switching combines the advantages of message and circuit switching. Data is delivered in packets rather than continuous streams in packet switching. When one node delivers a file to another, the file is split into packets to determine the most effective way to send the data over the network at the time. The packets are then routed to their destination via network devices, where they are rearranged for use by the receiving device. The header is on top, the payload is in the middle, and the tail is on the bottom of the packet.

The routing and sequencing information is found in the Header section. The payload is where data is sent. The tail of the packet is a fault correcting code that is placed at the end of said packet.

A. STORE-AND-FORWARD:

Store-and-forward switching is the technique for switching data packets in which the switching device receives the data frame and then checks for faults before passing the packets. It makes it possible to transport uncorrupted frames quickly. The data packet will not be transferred from the starting address to the destination address immediately when using this method. Rather, it awaits until the complete data packet arrives at a node before moving on to the next. Complete data packet is preserved in memory using this technique. Following that, the source address, destination address, and CRC are all verified. If there are no problems, the data packets are delivered to the target address in their entirety. This method avoids truncation or damage to data packets as they travel to their destination. This method is called as store-and-forward because it requires storing, validating, and then forwarding.

B. VIRTUAL-CUT-THROUGH:

Messages are not delivered as a complete data packet in virtual-cut-through switching; instead, they are forwarded immediately once they are retrieved by the network node. The buffer property on network nodes must match the size of the data packet. It is used to temporarily store packets. If a node's buffer is full, it simply sends a chunk of the data packet to the next node as soon as it receives it. While this sort of packet switching lowers packet transfer delay, it also increases the risk of broken or unfinished data packets being sent.

C. WORMHOLE SWITCHING:

Wormhole switching is a basic flow control mechanism ina computer network that relies mostly on fixed connections.Wormhole switching is a flow control approach that is a subclass of flit-buffer flow control. Every packet of data is furthermore categorized to flits in wormhole packet switching, and nodes are allotted buffers that are the similar size as the flits. In a pipelined sequence, they are then transported from the starting node to the end node. Despite the fact that wormhole switching overcomes the problem of blocked packets, the wormhole switching delay is much like the cut-through packet switching time.

IX. ROUTING PROBLEMS

Certain problems are likely to develop during the transmission of a packet from the sender to the receiver. These issues might arise because of congestion or a delay.Here are a few of these topics:

A. DEAD-LOCK:

When there are two packets that are waiting to be routed occur at the same moment, this is known as a routing deadlock. When each packet's resources aren't available to the other, this happens. It's a phenomenon that occurs anytime there's a cyclic resource dependency. The flow control mechanism in use is in charge for network resource management. Because no additional resources are allocated, packets that fail to release resources cause the route to be blocked.

B. LIVE-LOCK:

A live-lock occurs when data packets are continuously routed around the destination without being delivered. It's a phenomenon caused using adaptive routing algorithms, in which messages are redirected in the goal of finding a new way to their destinations. This type of routing difficultyis different from deadlock in that it runs continually, whereas deadlocks are always interrupted. Setting the TTL (time to live)or prioritizing older packets for transmission first can help resolve a live-lock.
When nodes want to communicate with each other, they infuse their messages into the network. A uniform injection model follows when all the nodes send their messages at the same time,with the network which is clear of messages.
This can be compared to dynamic injection, as per to which nodes can infuse their messages at random times. Livelock can occur if dynamic injection is used. It will not occur if the fixed injection is used. Many routing policies can also be used to prevent livelock.

C. STARVATION:

When the packet with the lowest priority fails to reach its destination, it is referred to as starvation, and the packet with a higher priority is always given more resources. Because of which, low priority packets are always denied the resources required to reach their destination. Several routing strategies canbe employed to prevent starvation. The most basic strategy is toprovide each node its own injection queue, where it stores the messages, it wants to infuse into the network. Non-adaptive routing algorithms ignore all these factors, lowering the suggested system's practicality and efficiency.

X. NOC TOPOLOGIES

A. MESH TOPOLOGY:

This is one of the most popular interconnection designs. Every node in this architecture is linked to its neighboring node to form a mesh. The mesh consists of n rows and m columns. The X and Y coordinates of each of these nodes are used to address them in a network. It is a form of direct topology in which nodes are connected directly. It enhances scalability while simultaneously providing significant route variety. The data is shared among all nodes. It has a large number of source-to-destination paths as well as an efficient addressing mechanism that prevents network outages. Regardless, one of the major disadvantages of this architecture is that the diameter grows exponentially as the number of nodes increases. This is due to inconsistency in the degree. All nodes are linked together in a 2D lattice, and neighboring nodes are linked together. In a mesh architecture, inter-switch delays and network robustness may be avoided. Furthermore, the linked bandwidth differs significantly from node to node, with edge and corner nodes having the least capacity. The Manhattan Street network is another name of this topology.

B. TORUS TOPOLOGY:

This network is a more advanced Mesh-topology. However, Mesh-topology has a smaller radius. Consequently, the torus topology solves the problem of mesh topology diameter increasing in parallel with network size. This is accomplished through the use of direct links among end nodes in the same row or column. The main advantage of this topology is that it may enhance path variation due to its symmetric edge geometry and low hop count. This network type offers a broader range of routing options, including more basic paths. The fundamental disadvantage of this network is that as the length of wirerequired to connect nodes in rows and columns becomeslonger, the latency increases.

C. TREE TOPOLOGY:

Tree topology is made up of parent nodes and child nodes, with the parent nodes leading to the child nodes. The nodesabove the present nodes are known as their ancestors, while the nodes below them are known as their children. There are duplicated ancestors connected to each node in a fat-tree architecture, providing numerous alternate pathsbetween the nodes. This topology gives nodes on the network access to more system resources, and it is assisted by a number of retailers. The root node, on the other hand, is its bottleneck, and its failure might bring the entire network down. Furthermore, as the tree length increases, the network configuration becomes more complicated.

D. POLYGON TOPOLOGY:

This topology is made up of many nodes, each of which is connected to every other node in the network. A circular topology in which data packets travel in a loop, from one node to the next, is the most basic example of this topology. Concatenating the ring with chords is one way to achieve a varied routing.

E. BUTTERFLY TOPOLOGY:

The nodes in this topology are organized in the shape of a butterfly, with routers between the wings. The packet's path will be pre-defined or pre-established, and it may be unidirectional or multidirectional. Take, for example, a multi-directional butterfly network. The inputs and outputs of this network are on the same side of the topology. Before being returned to the output side, the incoming packets are routed to the other side. This architecture links many computers to high-speed networks. Processor nodes, routers, and connections are the major components of this architecture. Butterfly topology design and implementation involve network characteristics suchas bisection bandwidth, degree, and diameter.

F. RICOBIT TOPOLOGY:

The RiCoBiT is composed of nodes connected in a ring, each of which is linked to two different nodes in the next ring, resulting in a ring-connected binary tree. RiCoBiT is composed of concentric rings of nodes connected by binary trees. The rings in the topology are assigned a number to K, with nodes ranging from 0 to 2L-1, where L is the present ring number. The nodes are addressed according to the ring they belong to and where they are in that ring. The level numbering system starts at one, while the node address numbering system starts at zero. Ring one is the name given to the first ring. Each ring contains a total of two L nodes. The integration formula for calculating number of nodes in the entire architecture is as follows:

$$N_r = \int_{L=1}^{K} 2^L \ldots\ldots\ldots (1)$$

RiCoBiT design has several advantages. The architecture is simple, regular, and symmetrical. It's also well-organized, scalable, and modular. Performance facilitates scalability without necessitating a significant rise in area. An optimal routing algorithm provides strong support for the architecture. The architecture is particularly good for adaptive routing in various traffic situations since there are several shortest paths. The architecture has been discovered to be superior to the presently used mesh and torus architectures.

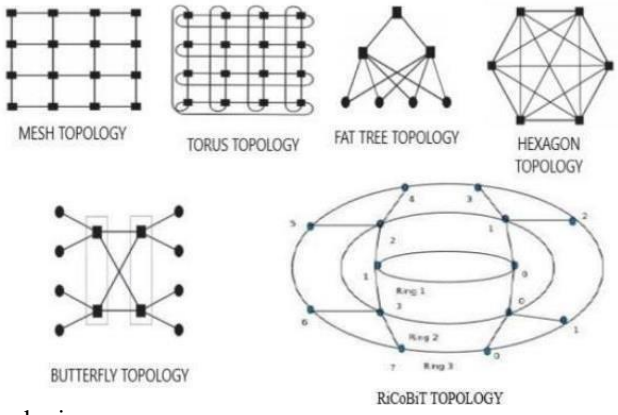


Figure 3: NOC Topologies

XI. NOC ON MULTIPROCESSOR SYSTEM

Emerging user applications in the next generation of embedded devices demand a high degree of performance. As a result, for the efficient construction of these complex future embedded structures, new techniques and connection mechanisms are required. MPSoCs (Multi- Processor System-On-Chips) are made up of complex integrated components that communicate at extremely high speeds. It would be impossible to meet the interconnectivity needs of MPSoC's with hundreds of cores by using a single bus or a hierarchy to eliminate several of the expenses of buses and MPSoC's connected via basic communication architectures. NoCs have been offered as a feasible solution to the MPSoC scaling challenge. NoCs bring packet-based communication principles to the on-chip realm, and they address many of the impending issues of interconnecting intricate designs more effectively than buses in terms of sophisticated protocols and topological design. In early NoC topology design attempts, the use of common topologies, such as meshes, such as those used in macro- networks, was predicted to lead through predictable and regular layouts. Although this is valid for architectures with homogeneous processor cores and memory, it is not valid for most MPSoC's because they are made up of heterogeneous cores, and common topologies lead to bad throughput as well as significant power and space overhead.

This is owing to the MPSoC's very non-uniform core sizes and the design's floorplan, which differs from typical topologies' regular, tile-based floorplan. An application-specific NoC with a customized architecture that meets the design objectives and limitations is required to possess an efficient on-chip connection for MPSoC's.

XII. CONCLUSION

In the paper, we explored various Network-On-Chip ideas and a few key challenges associated with packet switching network connectivity, and furthermore discussed the design of an SoC system. We additionally looked at the characters in various architectures to see how easy it would be to construct a new network. In addition, we learned how to apply network principles to the NoC system and how to construct topologies in NoC. We have also mentioned how NoC may be used to create Multiprocessor Systems. However, more research is yet to be conducted to design an NoC system that would meet the current and future needs.

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AN INNOVATIVE APPROACH FOR MONITORING BRIDGE SAFETY SYSTEM USING IOT

Sharat S K and Ashok K Patil

School of CSE, REVA University, Bangalore, India

Abstract.

An IOT based device is being developed using WSN technology. We have become smarter and more effective in our daily lives as a result of the arrival of ultra-technological devices. Sensor technologies have advanced as a result of the integrated problem-solving bridge tracking system, which assist with emergency case. An Internet of Things-based bridge protection control device is being developed. Wireless sensor nodes can collect a variety of data, including environmental patterns, vibration, and air quality, as well as high-priority structure data, such as accident data. It will also be beneficial to monitor and monitor such data. This paper, main purpose is to create a gadget that can protect flyovers and bridges from collisions and structural disasters. This proposal analyses the various techniques for tracking bridge conditions and offers a system for tracking continuous infrastructure as well as a water sensor to track the river's water level in order to stop traffic from the bridge under flood conditions. Users can track bridge conditions in real time using mobile telecommunications devices since the identified data is sent to the server and database.

Keywords.

1. AIM

Our project's goal is to create an internet of things-based bridge well-being surveillance entity that includes monitoring systems established in the overpass ambient, communication appliance that connect the bridge estimation mechanisms to the cloud computing service, a vital databank that forages bridge quality record, and a cloud computing environment that measures and examinates data emitted from the surveillance system. The state of a bridging and its surroundings, along with water points and additional security concerns, will be monitored, and analyzed in real time by this technology.

2. INTRODUCTION

One of the most widely used systems for monitoring and detecting environmental conditions is the structural health monitoring system. Under the influence of dynamic loads such as moving cars, crowds, wind, and earthquakes, the bridge structure may shake. The analysis is a crucial part of the overpass construction examination. This information could be utilized in favor of bridge security administration also disaster rescue within the failure case. WSN technology is used by the system for monitoring and information communication. As a cordless smart sensing element system, it acts a vital function in distant controlling in a wide range of geographical locations. When a bridge collapses, it puts human life and property in jeopardy. Many of these bridges are deteriorating because of both external and internal issues. It causes a tremendous vibration in the bridges due to dynamic loads, earthquakes, and ground motion. As a result, the acceleration increases, affecting the ease and surety of the overpass framework. We present an IoT-based comprehensive bridge surveillance scheme for preventing flyover accidents and structural calamities. The server receives the problem-solving time worth from all sensors also sends over the server. In case sensing element rate exceeds a set boundary, the method gives persistent sound also a buzzer which alerts operators/users. There are numerous bridges in Korea that have real-time monitoring systems, such as the Akashi Kaikyo Bridge. Sensor technologies have improved the accuracy and speed of the monitoring process. The method created in this study has the potential to prevent accidents and increase bridge safety monitoring in the face of various disasters such as flooding, wind, earthquakes, large loads, and vibration.

Fig 1: Bridge

3. LITERATURE SURVEY

R. Pawar [1] described the constructional Structural health controlling device is utilized to estimating the fundamental framework of the structural and surroundings terms on a constant basis at actual-time. Aims of structural health monitoring is to find construction harm, security, accident etc. In late period the overpass examination is a critical point because of vast count of bridges crumbling accidents. Therefore, it is required to take concern of bridges by utilizing various enhanced as well as smart technological views.

Ren-Guey Lee et al. [2] grants an effective and reliable substitute design for overpass controlling device by utilizing the wireless sensor network. By gathering the surroundings limits sending the numeral record to entry over the numerous hop transfer, and then it advance stores info in the back-end server for the particularized controlling staffs to examine and report. This device will be capable to enhance the nuisance to include or eliminate sensing elements in an existent wired overpass controlling system. It is primarily utilizing wireless detector network in order to assemble relevant atmosphere framework also to send the numeric record to portal over multiple-hopping relay.

Jin-Linn Lee [3] elucidated Internet based overpass security device is designed by ZigBee technique. The device is composed of tracking devices established in the overpass habitat; communication systems linking the bridge surveillance systems as well as cloud database; a vital record that stores overpass status info; and a cloud database that computes also examines record sent from surveillance devices. In this work, an internet-based overpass security system is established by utilizing ZigBee methodology.

Ms.Shital Nandkishor Vitekar , Ms.Viddulata A. Patil [4] proposes a wirelessly smart detector system are carrying out necessity function in the utilization of distant controlling in extensive circulate geographical locations. Similar wireless network turns charge effectual and feasible method to control basic wellness condition of bridges which link road in equally rural and urban regions. Several of these overpasses are matter to degradation due to exterior and interior parameters. Web-based, effective time structural wellness controlling is an inventive device to assist quick area survey.

Shivan Haran, et al. [5] examines the observation of bridges exploitation by wireless sensing network. As a testbed, a diverse system of wireless sensor network also convectional P2P alongside a collection of detection system is utilized on overpass prototype. Problems associated with status evaluation of the bridge for things as well as faults, overloads, etc., also as examination of network and device execution is mentioned. Wireless sensing networks are demonstrating to be a better suit where actual time controlling of vigorous physical frameworks are essential.

Tyler Harms, etal., [6] proposed an older and deterioration of conveyance infrastructure posture substantial protection problems, specifically in light of higher utilize of this framework. The cost-effective decrease additional exacerbates such issues, mainly for crucial frameworks such as bridges, where substitutes is unfeasible, also support and renovate are high priced.

4. EXISTING SYSTEM

For a long time, bridge structural health monitoring (SHM) has been a hot topic of research. Installing sensors on a bridge is a traditional, straightforward method of collecting acceleration readings. The disadvantage about straight forward method is they necessitate a tangled as well as expensive digital framework that includes installation, sustainment, also capacity supply. Furthermore, while it is simple to obtain many data samples, labelling them is costly, as it includes physically inspecting the bridge and evaluating its condition; as a result, only a small number of data samples are obtained. This oblique overpass SHM becomes a semi-directed categorization issue because of this real-world limitation.

5. PROBLEM STATEMENT

- To help in the continuing bridge management activities of local bridge authorities, the research group has developed Structural Health Monitoring (SHM) techniques.
- The current standard procedure of bridge inspection is focused on biannual visual inspections that, by default, are arbitrary.
- The transition from the scientific community to realistic field application of conventional SHM techniques still needs to address challenging challenges, primarily due to technological and economic considerations

6. PROPOSED SYSTEM

The system sends actual-time monitored record to cloud computing database also to device database for substitute objective. The detectors established upon diverse sections other overpass controls their respective parameters. Crossing the threshold rate, the transmission device notifies the administration core granting alert. This entire framework of overpass are captured through microcontroller which sends to operator managing room. Wi-Fi is used for communication. Bridge overflow is detected using Water Level Sensors, Fire is detected using fire sensor, unstableness of the bridge is identified using vibration sensor, dense smoke is indicated by smoke sensor along with temperature and humidity value using DHT11. Also, whenever any accident is detected, a notification is sent to authorized person.

7. OBJECTIVE

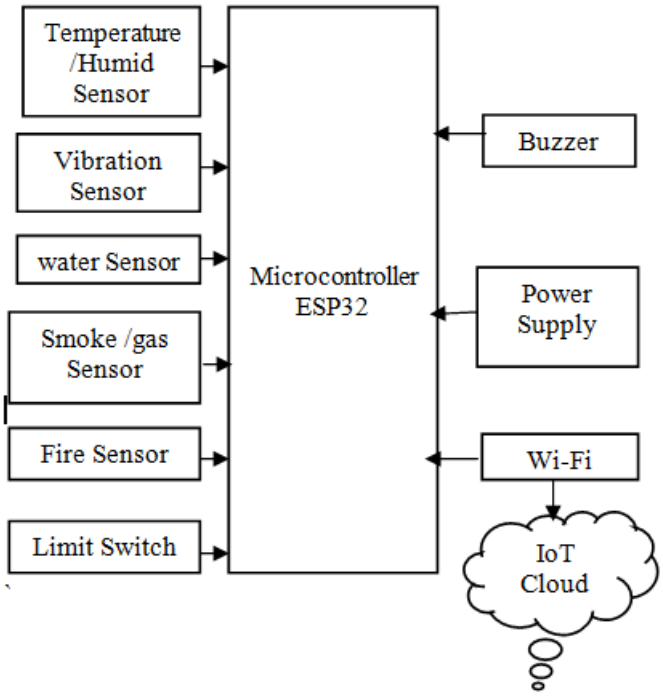
Our project aims to build an IoT-based bridge safety monitoring system consisting of monitoring devices mounted within overpass surroundings, message system linking overpass surveillance systems also a complex database that stores overpass controlling entities as well as cloud databases. This technology tracks and analyses the state of the bridge and its surroundings in real time, including the level of water and other safety conditions.

One of the key objectives of Bridge Safety Monitoring device is utilizing internet of things to rescue the existence of the citizens, in order to safeguard from misadventure.

Some aims of the overpass safety surveillance device are:

- To deliver security for overpasses.
- To prevent misadventures against bad weather conditions.
- To enhance the overpass effectiveness.
- To overwhelm the technological as well as expenditure barriers.
- To avoid unnecessary traffic
- To make it free of pollution

8. METHODOLOGY



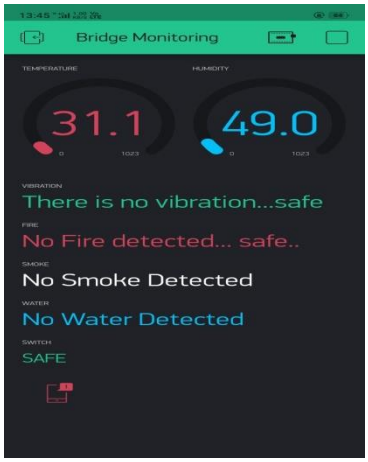
The current device is the progress of overpass surveillance device using internet of things. This device constantly tracks the overpass status. They utilize a distinct detector in order to access the overpass data like water detector, load cell detector, vibration detector, temperature detector and smoke sensor. The load of the vehicle is acquiring over the bridge is sensed by the trembling utilizing a vibration detector. Through utilizing the water detector device for acquiring the aqua rate beneath the bridge. Smoke or polluted air is monitored by smoke or gas sensor. All detectors obtain the actual-time rate which transmits to the database as well as to android. The examiner signs in to android system

where the record is examined which is later transmitted by the device. It transmits the info to the operators. Operator will be able to view the info which are previously recorded in the server this record would assist the operator to perceive the information of the overpass. This info will be useful to prevent misadventure also all particular record would be transmitted on mobile application. In case of detector value is beyond then the limit, the device will alert operators by an alarm by notifying them.

9. SOFTWARE AND HARDWARE REQUIREMENTS

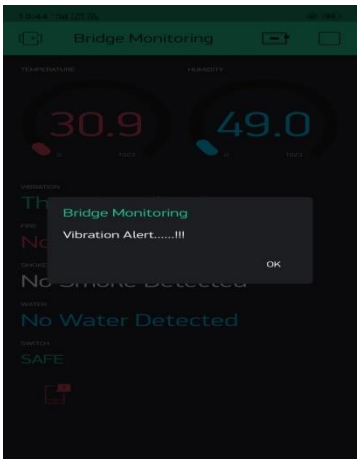
- **Software Requirement**
  - Arduino IDE
  - C++
  - IoT platform (BLYNK)
- **Hardware Requirement**
  - Water sensor
  - Vibration sensor
  - Temperature sensor
  - Smoke/gas Sensor
  - Buzzer
  - Limit switch
  - Fire sensor
  - Microcontroller (ESP32)

10. RESULTS



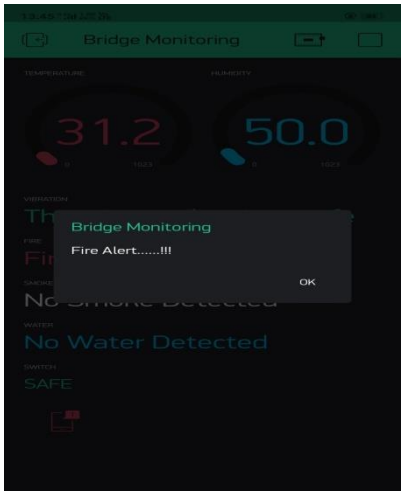
Result 1: Blynk App

The above Figure represents the Blynk Application.



Result 2: Vibration Sensor

Any unstableness in the Bridge the through the Vibration Sensor notification will be send to the Mobile.



Result 3: Fire Sensor

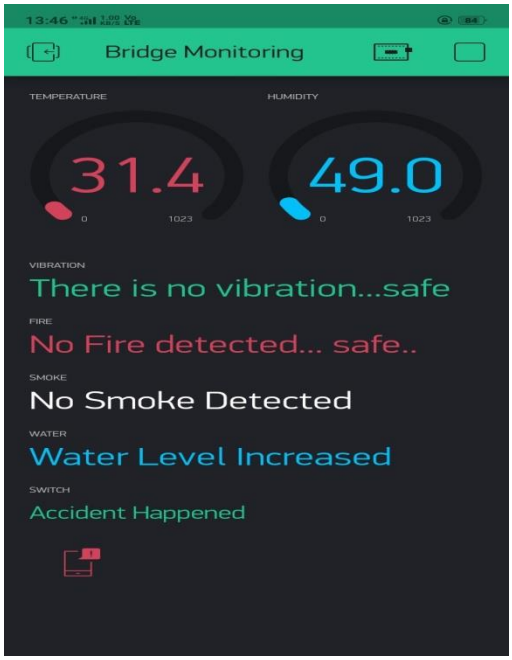
If any fire Hazards happens on the bridge the fire Sensor sends the signal to the ESP32 from ESP32 to Mobile (Blynk Application).

Result 4: Smoke Sensor

If any Smoke is detected the Sensor sends the data to the ESP32 then ESP32 to Blynk Application.

Result 5: Water Rate Level Sensor

If the Water Rate level Rises to the Bridge Level or to Some Pre-set Valve the Sensor senses the Water and sends the data to the Blynk Application.



Result 6: Switch

The push button switch is used when an Accident occurs the switch will be pressed so that the Accident Indication will be Displayed in the Blynk Application.

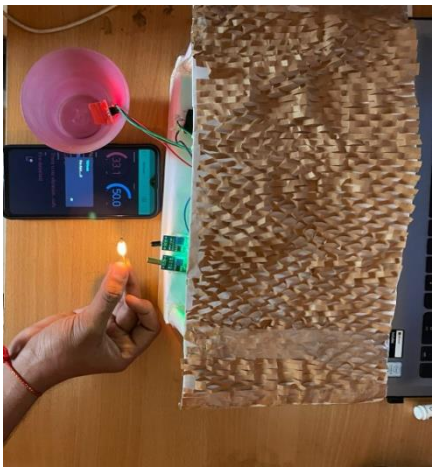


Fig 2: Complete Setup

The above Figure is the representation of the complete model Setup with ESP32, Vibration Sensor, Water Level Sensor, Fire Sensor, Smoke Sensor, Switch and Blynk Application.

11. CONCLUSION

The proposed concept is the creation about Internet of Things-based overpass security surveillance technique. The system uses water, fire, and smoke sensors to continuously check the bridge's condition. All sensors collect effective time record which transfers to the server, which is then presented on the Blynk Android app. The information can be useful in preventing accidents, and it will all be shown on a digital display. If the sensor value exceeds the threshold, this device urges a sound with alarm and alert users.

12. FUTURE SCOPE

The prototype of the system can be deployed as numerous structures in the future, such as enormous walls, in addition to buildings and bridges, making it more robust, portable, and user pleasant than present technology.

The system proposed is based on Artificial Intelligence, the Voice Bot utilizes the python programming language to provide an interface for the user to interact with as the GUI (Graphical user interface). The bot uses multiple API's (Application Programming Interface) for the speech recognition and text to voice conversion like the Speech Recognition and REST (Representational State Transfer), Django etc. For getting responses from the back end it utilizes SQL (Structured Query Language).

3.1 SYSTEM MODEL

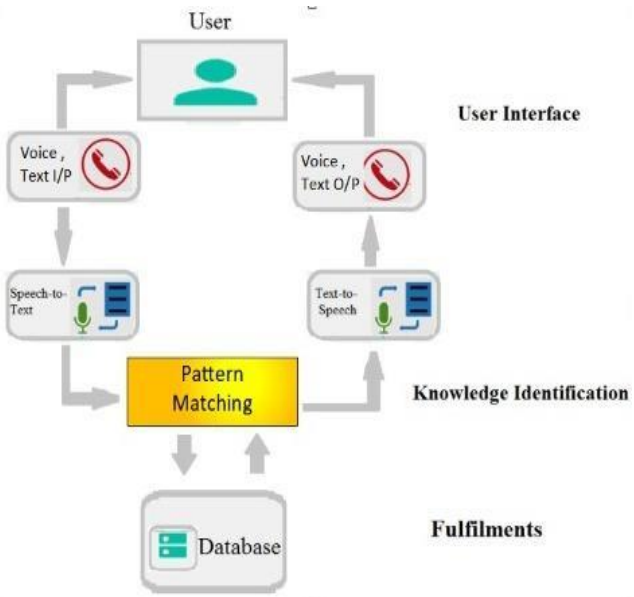


Fig 2. System Architecture of Voice bot

The Fig. 2 explains how the voice chatbot handles the queries from the user to give responses through speech and text with the help of text-to-speech and speech-to-text conversion and fetching responses from the database after pattern matching.

3.2. MODULES

3.2.1 VOICE TO TEXT DIAGRAM

The text to speech conversion system utilizes the speech recognition package where feature extraction takes place and the acoustic and language modules are applied to give out the textual output in the notepad. The user's input in the speech or voice format is converted to text and printed in the notepad as shown in Fig. 3.

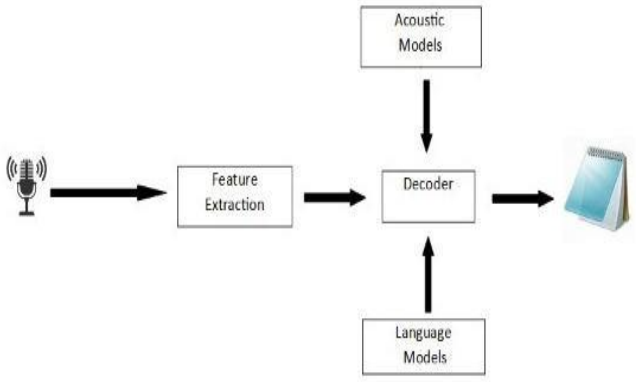


Fig. 3: Speech to text converter process in notepad

3.2.2. VOICE CHATBOT

The Voice chatbot makes use of the speech to text converter and also implements text to speech to provide the response. It uses Natural language processing with speech recognition and pyttsx3 (python text to speech).The Fig. 4 displays the working of the Voice chatbot.

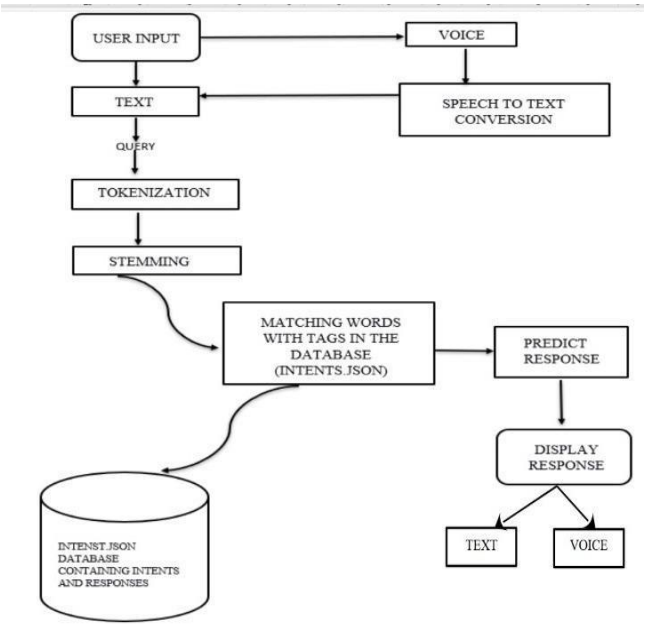


Fig. 4: The Working model of completed Voice bot

13. IMPLEMENTATION

4.1 ALGORITHMS

Lemmatization and POS (Part of Speech) tagging, using WordNet: Deleting of the data in the input text is done by removing keywords. The appropriate Lemmas keywords were obtained using the Lemmatization and POS tags, combined with a different type of translated word. WordNet from the Python package "NLTK (Natural Language Processing)" was used for this purpose.

4.2 NATURAL LANGUAGE PROCESSING

NLP (Natural Language Processing) is used as one of the most important concepts in bot design. Machines use sophisticated algorithms to separate any text content in order to extract meaningful information from it. The data collected is then used to further teach the machines the natural language skills.

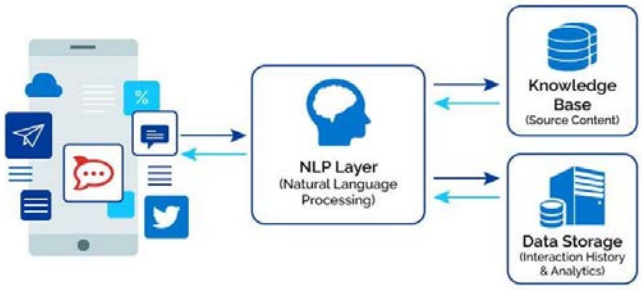


Fig5: NLP Working from KollaBhanu Prakash, "Chatterbot implementation using Transfer Learning and LSTM Encoder-Decoder Architecture", Volume 8.No. 5, IJETER, May 2020.

The Natural Language Processing layer utilizes both the data storage and the knowledge base in order to retrieve appropriate and accurate responses to the given query submitted by the user as shown in [7, Fig.5].

Incorporating NLP into chat bots gives the meaning of having higher human presence. When a chat bot is developed and used, this is a common use, hence there are questions asked regarding it. It seems so intertwined with human behavior that customers can try to trick and discard the chat bot. It can be solved by adding automatic answers, but that is often a failure as it is almost impossible to wait for what queries to be answered and how they will be solved. The goal of Natural Language Processing is to build a type of system that can understand and give meaning to a text and also perform tasks automatically like classification, translation, etc.

4.2.1 STEPS OF NLP ALGORITHM

1. Lexical Analysis – It is the first step in the Natural Language Processing responsible for the source code scanning in order to convert a string of characters into meaningful expressions, this phase divides the input text into sections, words and sentences. Tokenization, Lemmatization and Stemming techniques come under the Lexical Analysis.
2. Syntactic Analysis – This phase of NLP is mainly used for parsing and providing relationships between the different words and also to check their arrangement and grammar.
3. Semantic Analysis- This analysis is based on the meaningful representation of the words and it focusses on the literal meaning present behind them.
4. Discourse Integration – Integration of speech depends and is implemented based on the meaning of the sentences that come before it.
5. Pragmatic Analysis – This final phase focusses on information extraction from the provided text, it plays by a set of cooperative dialogue rules.

4.3 LSTM (Long Short Term Memory) ALGORITHM

Long Short Term Memory (LSTM) networks are a type of recurrent neural network required in complex problem domains like machine translation, speech recognition, and more .LSTMs are a complex area of deep learning.

The LSTM model network is called as the model that has influenced the past and is known to display the capability to learn from sequential data. LSTM consists of three gates-input, forget, output gates [7].

$f_{m+1} = (^{(h\to f)}h_m + \theta^{(x\to f)}x_{m+1} + b_f)$ forget gate (1)

$i_{m+1} = (^{(h\to i)}h_m + \theta^{(x\to i)}x_{m+1} + b_i)$ Input gate (2)

$c_{\tilde{m}+1} = \tanh(\theta^{(h\to c)}h_m + \theta^{(w\to c)}x_{m+1})$ update candidate (3)

$c_{m+1} = f_{m+1}\Theta c_m + i_{m+1}\Theta c_{m+1}$memory cell update (4)

$o_{m+1} = (^{(h\to o)}h_m + \theta^{(x\to o)}x_{m+1} + b_o$Output gate (5)

$h_{m+1} = o_{m+1}\Theta\tanh(c_{m+1})$ Output (6)

The above equations represent the LSTM model [8]. The input gate checks if there is a need to allow the fresh data or not, forget gate deals with the unnecessary details. The proposed framework approach consists of various steps, such as raw data selection, pre-data processing, feature extraction and NN preparation.

14. RESULTS AND DISCUSSION

Speech recognition systems are tested using two factors: Accuracy and speed. Platforms used for voice chatbot functionality Windows 10, Python 3.8 IDLE, and PyCharm 2021.3. The test requires the following specification: 64-bit operating system with Intel core Processor 5.1.60GHz, OS version - Windows 10 One Home Language, Ram - 8.00 GB.

The simulation of a voice robot is performed in two parts with respect to the accuracy of word recognition by pronunciation in English. Voice recognition module is said to boast about 75% - 85% accuracy under noise and greater than 85% in good conditions. The Table. 1 and Fig. 6 pie chart show test results of the conducted simulations.

Simulation (Eng.-in)	Total words	Detected Words	Undetected Words	Accuracy
1	80	75	5	93.75 %
	90	84	6	93.33 %
	100	92	8	92.00 %
	110	97	13	88.18 %
	120	105	15	87.50 %
Total	500	453	47	90.6%

Table. 1: Manual Analysis Simulation 1

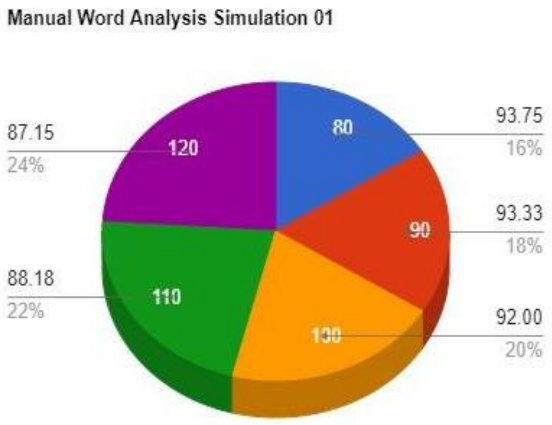


Fig. 6: Pie Char 1 for manual analysis 1

Second simulation was performed with a bit lower net speed and some introduction of background noise. The Table. 2 and the Fig. 7 pie chart below show the results.

The percentage is a bit less compared to previous simulation due to the presence of noise affecting the accuracy.

Simulation (Eng.-in)	Total words	Detected Words	Undetected Words	Accuracy
2	80	72	8	90.00%
	90	82	8	91.11%
	100	93	7	93.00%
	110	95	15	86.36%
	120	101	19	84.36%
Total	500	443	57	88.6%

Table. 2: Manual Analysis Simulation 2

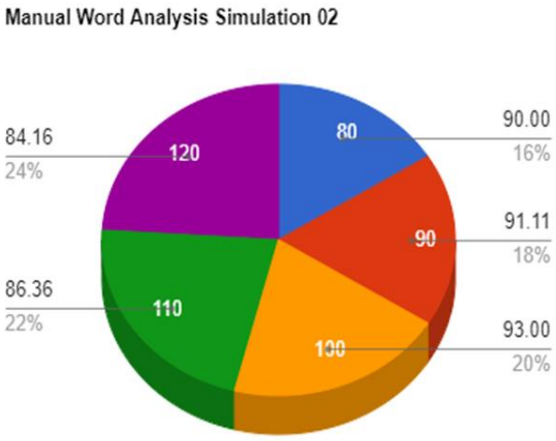


Fig. 7: Pie Chart 2 for manual analysis 2

15. OUTPUT RESULT

The outputs considering three scenarios are listed below:

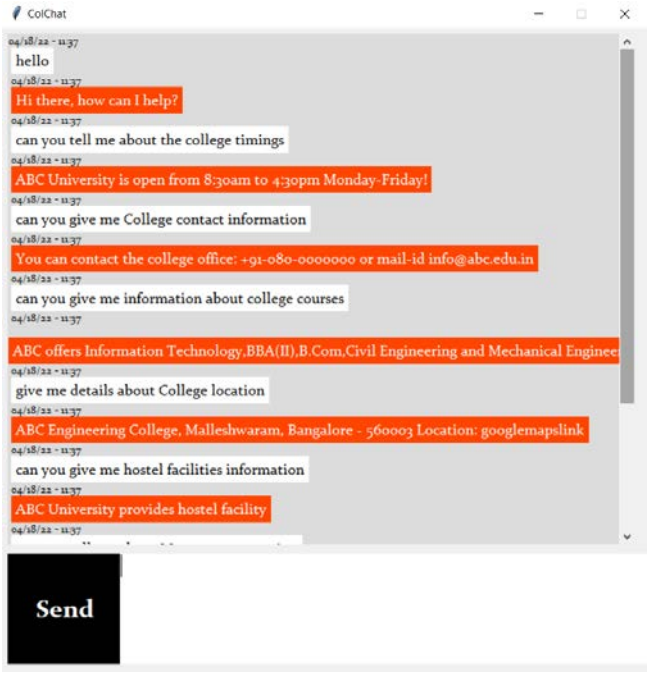


Fig. 8: Accurate Responses of the Voice bot

In Fig. 8 for any given input by the user or the customer as a query, the bot processes it and searches in the database, accurate responses are obtained in both textual and voice format to the user in the GUI (Graphical User Interface) and the speakers.

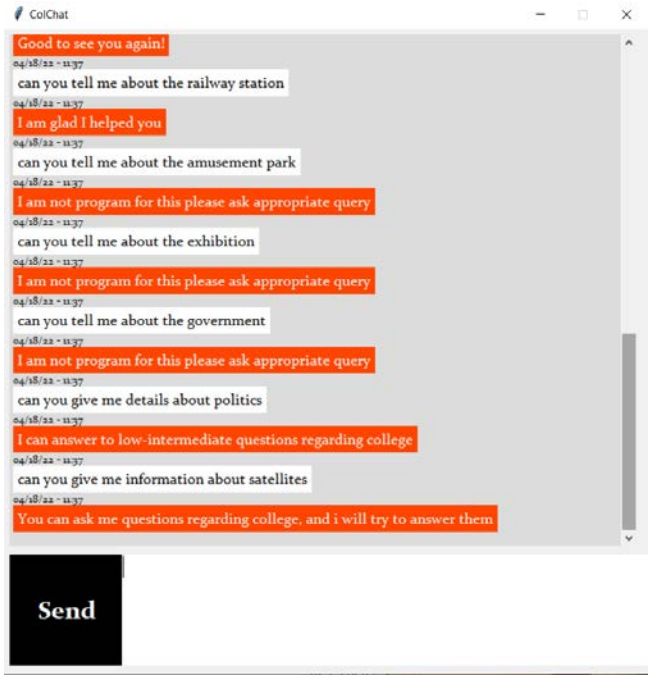


Fig. 9: Incorrect Response of the Voice bot

In Fig. 9 when the user asks queries not related to the domain the bot's response is as shown in the figure. Since the keyword is not found in the database the bot responds saying 'I am not programmed for this please ask appropriate query".

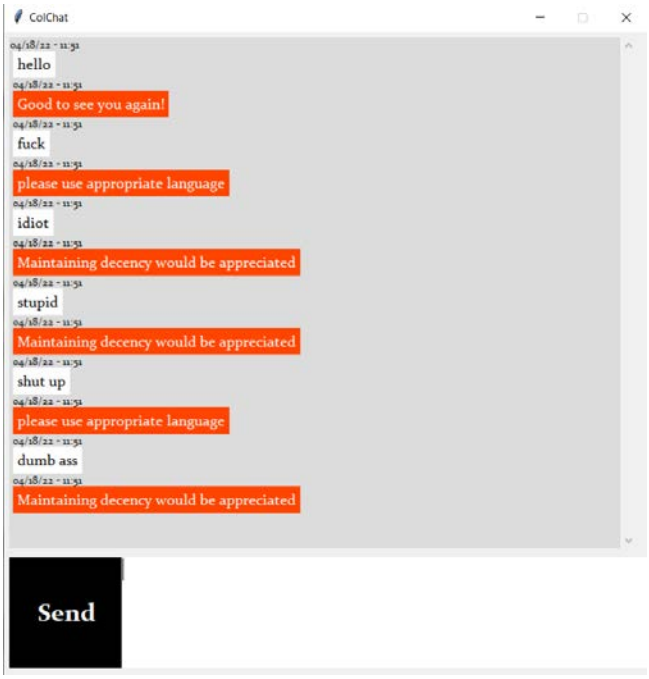


Fig. 10: Indecent Queries of the Voice bot

In Fig. 10 when the bot is misused by the user by cursing, it responds with either “Please use appropriate language or “maintaining decency would be appreciated”, which re the input given in the database for the usage of inappropriate queries. The bot can handle unethical behavior of users while taking the input from them. The database is equipped to handle such situations and if required can be improved with more content.

16. CONCLUSION

In today's world of automation the voice bot is well suited to its voice and text resources. The paper uses Voice Chatbots and Machine learning concepts, as well as NLP for input and feedback. The main goal is to reduce human interaction, increase automation, provide audio filters and provide in-depth information to disabled users and photographers by input and output in two ways. Objectives were introduced and applied to the bot.The bot can be made accessible to users on many web platforms on institutional websites, the accuracy of the bot can be increased through audio filtering functions. By combining a lot of pronunciation it can be used by different people. It can be upgraded to an app for frequent and easy access. It will be useful in all areas as without wasting much time, it gets to the right information and that too without filtering. It can be developed to receive queries in two languages and provide respond in the same input language as the user asks. It can be improved in the future by solving obstacles and taking it to the top in a web-based environment.

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Performance Analysis of adaptive enhancement algorithms using Quality Metric Parameters for autonomous navigation of an unmanned mobile platform in a low illumination environment

[1]Girish H, ,[2] Jharna Majumdar ,[3] Chetan Naik, [4] Jenita Subhash, [5] Sneh Rachna,[6] D.Antony Louis Piriyakumar

[1-5]Department of ECE , [6] Department of AI & ML ,Cambridge Institute of Technology

[1] hgirihphd@gmail.com, [2] dr.jharna_majumdar@cambridge.edu.in, [3]chetan.ece@cambridge.edu.in,[4] jenita.ece@cambridge.edu.in, [5]rachna.ece@cambridge.edu.in, [6]dean_rd@cambridge.edu.in

Abstract.

An efficient technique for enhancing the contrast of a low light environment in an unmanned mobile platform is emphasized in this paper. The information lost in the image is to be avoided for that Histogram Equalization (HE) techniques is used to make the smoother curve in the histogram. In this paper, we have considered six algorithms ESHE, RMSHE, ClaRMSHE, R-ESIHE, RS-ESIHE and WTHE. In these algorithms the quality metrics like MSE, RMSE, RMSE_SW, SSIM, UQI, MS-SSIM, ERGAS, SCC, SAM, VIFP and PSNRB have been considered. The performance analysis with respect to the quality metrics for all the algorithms is examined and is observed that RS-ESIHE, ESHE & WTHE are having good performance in contrast image enhancement in that RS-ESIHE has better performance, which improves the contrast of the image. The novelty of this paper is that all the new alogorithms related to adaptive image enhancement techniques have been implemented and simulated using Matlab tool. The quality metrics of each image has been compared with all algorithms using sewar library and matlab tool box. Depending on the quality metric parameter, the RS-ESHIE has better outcome compared to other algorithm which would be implement for medical robot for hospital and robots for agriculture applications.

Keywords. ESIHE, RMSHE , claRMSHE, R-ESIHE , RS-ESIHE , WTHE, MSE, RMSE, RMSE_SW, SSIM, UQI, MS-SSIM, ERGAS, SCC, SAM, VIFP and PSNRB

1. INTRODUCTION

Digital image Enhancement technology are considered one of the basic problems in computer vision. Monitoring, visualization systems, human interactions, and computer interactions, and many applications are widely used in many applications. In most occasions, the contrast of digital image or video is very poor. This can be caused by many situations, including the inappropriateness of the equipment for the purchase of the worker and the inappropriateness of the equipment for purchasing images. In most cases, the captured scene is an adverse environmental condition, such as an adverse environmental condition like dark light, cloudy and so on. These conditions can also reduce the quality of the contrast. Considering the above problems, many researchers are still focused on improving the contrast of the image. In general, how to improve bad contrast images, it is widely used for two categories of direct improvement and indirect improvement. Direct Improvement Method allows you to determine the contrast of the image as a particular contrast period. However, many of these parameters cannot simultaneously measure the contrast of the image's simple and complex template. There are a variety of ways to improve the image to increase contrast of the digital image. For example, histogram equalization (HE) is a most extensively used because of its ease and easy to implement. Unfortunately, Histogram equalization do not give satisfactory results in all occasion.

Low light adaptive Image enhancement algorithms have been extensively used in many image processing applications in which the quality of a digital image from a video is important for human interpretation. Contrast is a best parameter for assessment of digital image quality. Contrast creates the difference in luminance reflected by 2 surfaces which are adjacent to it and can also be used to improve the visual properties objects from the image. In human eye perception, contrast is can be obtained by the bright and color differences of an object from another objects. Human eye visual system is sharp with respect to contrast than the brightness. Henceforth all humans can perceive the world in the same way in spite of abrupt changes in lighting conditions. Histogram equalization algorithms could be accomplished to solve the problems in image processing.

2. LITERATURE SURVEY

W. Wang et. Al. proposed a Image captured below terrible illumination situations frequently showcase traits like less brightness, less contrast, a low grey values, and colour distortion, in addition to substantial noise, which severely have an effect on the subjective visible pact on eyes of human and restrict the overall efficiency of diverse system imaginative and prescient. The position of low illuminated image is to enhance the visible impact of such digital images for the advantage of further process of the image. This paper proposes the principle strategies enhancement of images evolved in few decades. [1] .

K. K. Koonsanit et. Al. B. Instant digital Image, No video-Processing, Indoor-Storage, and Low Dose in radiations. Generally, X-ray images from digital flat detectors include poor image quality that might not be used for diagnostic planning and treatment plans. Thus, pretreatment techniques are mandate to improve the image quality. The work presents the image enhancement of digital mamogram imaging using so-called Nclahe technique based on regional improvement [2].

K SINGH et al. proposed contrast enhancement techniques with removal of noise in the dark images in DCT areas. The improved techniques is recycled to the transition DCT coefficient submitted from the inferior state in the improved state. This is caused by internal noise that is existing due to the deficiency of appropriate illuminated image and can be modelled by a common two-stability systems. This technique employs fewer adaptive processing to improve image contrast and colour information while ensuring better quality[3].

3. ADATIVE IMAGE ENHANCEMENT

HE is a method used for contrast enhancement in digital images that tend to alter the digital image taken from a video to increase the brightness. Maintaining the actual brightness is very much required. The main goal of HE is to equalize the histogram of the input images. To perform the HE technique is to measure the current sum of the histogram values, to divide the entire image by the maximum values of pixels to normalize the current total, to multiply the digital image with normalized value by the highest gray value and round to the nearby integer and finally to map grayscale values with a one-to-one mapping.

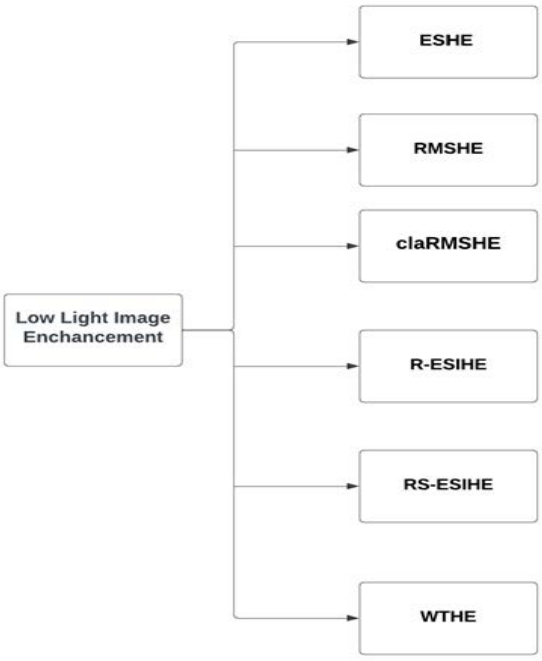

Fig 1: Low Light Adaptive Image enhancement algorithms

In this paper Low Light Image enhancement algorithms like ESHE, RMSHE, claRMSHE, R-ESIHE, RS-ESIHE, WTHE with quality metrics have been analysed.

ESHE is processing algorithm which is reputed in low illuminated image processing to improve the distinction of the image extracted from the image/video taken from a camera for the unmanned area.

RMSHE algorithm for low light adaptive image enhancement is recursively used to split the histogram on the internal value of mean. The average illumination of the digital image processed is about the same as the glowing of the input image which is averaged. The RESIHE method is another form of ESIHE. The quantity of recursion depends on the subtraction in exposure of consecutive iterations. The steps for the algorithm is to divide and balance the histogram of the image. The original given image is first classified into two images and is represented as given below.

$$P_L(k) = \frac{h_c(k)}{N_L} \quad for \;\; 0 \leq k \leq X_\alpha - 1 \qquad (1)$$

$$P_U(k) = \frac{h_c(k)}{N_U} \quad for \ X_\alpha \leq k \leq L-1 \qquad (2)$$

The claRMSHE is a widely used CLAHE and RMSHE algorithms combined together to extracts the objects in a dark environments. claRMSHE is also extensively used by the image processing researchers to increase the brightness and the contrast of a digital image.

Conceptually RSESIE, a another version of ESIE which does consecutive decomposition of the histogram. The RSESIE recursively decomposes it into recursive level r based on the value of threshold of HE, sub-histogram of 2r. To generate the sub-histograms which are decomposed are then individually made equal. To simplify the recursion level, r is assumed to be 2. RSESIE includes calculation of exposure thresholds, deletion of histograms, separation of histograms, and leveling of histograms. The Xa exposure threshold for the complete histogram is given below.

$$X_{al} = L\left[\frac{X_a}{L} - \frac{\sum_0^{X_a-1} h(k)k}{L\sum_0^{X_a-1} h(k)}\right] \qquad (3)$$

$$X_{au} = L\left[1 + \frac{X_a}{L} - \frac{\sum_{X_a}^{X_a-1} h(k)k}{L\sum_{X_a}^{X_a-1} h(k)}\right]^{\frac{1}{2}} \qquad (4)$$

WTHE is a new algorithm which can outperform complexity in image processing of the Histogram Equalization method and increase its durability.. The concept of WTHE is to alter the histogram before flattening. WTHE is performed by changing the image histogram by assigning weights and thresholds to each pixel prior to HE. The probability density functions of weighted & threshold is represented as P (kn) are given by:, as in:

$$P_{wt}(k_n) = \Omega\big(P(k_n)\big)$$

$$= \begin{cases} P_u & if \ P(k_a) > P_u \\ \left(\frac{P(k_n)-P_l}{P_u-P_l}\right) rXP_u & if \ P_l \leq P(k_a) \leq P_u \\ 0 & if \ P(k_a) < P \end{cases} \qquad (5)$$

The exceptional metrics likes MSE measures imply squared mistakes i.e., the imply squared distinction among the predicted and real values. RMSE is the rectangular root of the imply squared of all mistakes. RMSE_SW Calculates the imply squared blunders the usage of the sliding window. SSIM is used to degree the similarity among images. UQI offers a worldwide photo exceptional index. MS-SSIM is a greater superior shape of SSIM carried out throughout a couple of scales thru a multi-degree sub-sampling process. ERGAS which Calculates the general and dimensional relative blunders. It is used to calculate the exceptional of the mixed photo in phrases of the imply well-known blunders for every variety of processed images. SCC Calculates the spatial correlation coefficient. It is a numerical degree of a kind of correlation, this means that that there's a statistical dating among variables. The Spectral Angle Mapper (SAM) is an automatic technique for at once evaluating photo spectra to a regarded spectra. VIFP is a complete reference photo exceptional evaluation index primarily based totally on herbal scene facts and the perception of photo records extracted through the human visible system. The top sign-to-noise ratio with blocking off effect (PSNRB) quantifies the broken diploma of noise with appreciate to the enter photo. The better the PSNRB is, the higher the de-noised digital image sign is.

4. EXPERIMENT RESULTS

MATLAB 2021 is applied to the algorithm considered here. The Personal computer is configured with i5 processor, 16G RAM, and Windows NT 10 operating system. The experimental scenes include image 1 : evening just started but we are able to see around.

Fig2a : input image 1

Fig2b : ESHE output

Fig2c : RMSHE output

Fig2d : cla-RMSHE output

Fig2e : R-ESIHE output

Fig2f : RS-ESIHE output

Fig2g : WTHE output

Image - 2 Evening little darker but still able to see with difficulties

Fig 3a : Input image 2

Fig 3b.: ESHE output

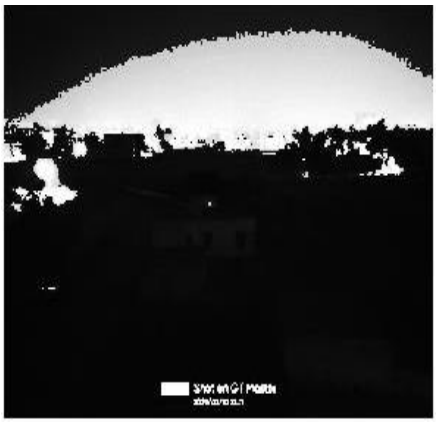

Fig 3c.: RMSHE output

Fig 3d.: cla RMSHE output

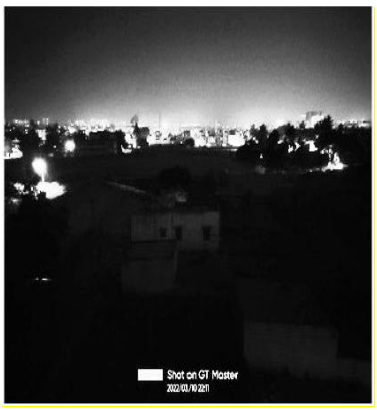

Fig 3e.: R-ESIHE output

Fig 3f.: RS-ESIHE output

Fig 3g: WTHE output

Image – 3 Evening Dark.

Fig 4a: Input image 3

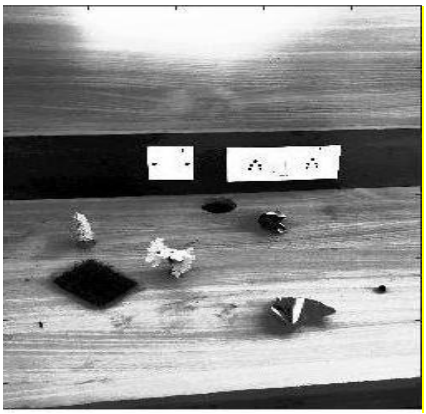

Fig 4b: ESHE output

Fig 4c: RMSHE output

Fig 4d: claRMSHE output

Fig 4e: RESIHE output

Fig 4f: RS-ESIHE output

Fig 4f: RS-ESIHE output

With histogram equalization, the pixels are evenly spread. The resulting image with histogram equalization usually has an unnatural appearance, which means that the image is overemphasized. WTHE decreases the impact caused by histogram equalization. The adaptive image enhancement algorithms have been utilized to increase the contrast of the digital image is emphasized, the noise induced in the image as an upshot becomes higher and the image looks unnatural. Histogram Equalization and Weighted Thresholds Table I shows the calculated quantitative measurements MSE, RMSE, RMSE_SW, SSIM, UQI, MS-SSIM, ERGAS, SCC and SAM values for histogram equalization.

Table 1: Output for image 1 with quality metrics for ESIHE, RMSHE, claRMSHE

QM Parameters For Image 1	ESHE	RMSHE	claRMSHE
MSE	5084.200915	5277.096174	25563.15847
RMSE	71.30358	72.64366	83.42581
RMSE_SW	29.4817698	30.02523130	129.9505448
SSIM	0.242316, 0.600003	0.071950, 0.469785	0.598769, 0.724133
UQI	0.499230	0.499005	0.119048
MS-SSIM	0.5634464 3	0.217519	0.710930494
ERGAS	7572424. 91	993358.6523	2053307.166
SCC	0.001312	0.005862	0.005707
SAM	1.129667	1.034359	1.127006
VIFP	0.030480	0.079122	0.079754
PSNRB	11.06753	10.90481	3.938166

Table 2 : Output for image 1 with quality metrics for R-ESIHE, RS-ESIHE, WTHE

QM Parameters For Image 1	R-ESIHE	RS-ESIHE	WTHE
MSE	5123.771684	9950.576715	7797.087177
RMSE	71.58052587	99.75257748	88.30111651
RMSE_SW	36.33088817	75.16261236	60.68850326
SSIM	0.53116, 0.716580	0.224892, 0.521556	0.598465, 0.726552

UQI	0.426449	0.314852	0.176146
MS-SSIM	0.658928	0.711639	0.452565
ERGAS	1012727.07	933778.231	2053307.166
SCC	0.004501	0.020476	0.009584
SAM	0.827387	0.926068	0.875468
VIFP	0.102563	0.141634	0.094495
PSNRB	10.87312	8.027420	9.053937

Table 3: result for image 2 with quality metrics for ESHE, RMESIHE, claRMSHE

QM Parameters For Image 2	ESHE	RMSHE	claRMSHE
MSE	18858.797058	12766.38973	6830.490986
RMSE	137.32733	112.9884495	82.646784487
RMSE_SW	123.2583009	64.50501232	35.49447975
SSIM	0.150495, 0.608782	0.583160, 0.673278	0.422295, 0.456406
UQI	0.0740318	0.1589600	0.084507
MS-SSIM	0.549302317	0.46418952	0.46071747144
ERGAS	158561.1621	409664.4216	100420.474247
SCC	0.062447	0.006754	0.009059
SAM	0.666790	0.875080	0.805904
VIFP	0.555932	0.129004	0.153298
PSNRB	5.218099	6.923819	9.782965

Table 4 :result for image 2 with quality metrics for R-ESIHE, RS-ESIHE, WTHE

QM Parameters For Image 2	R-ESIHE	RS-ESIHE	WTHE
MSE	16855.06	5894.5025	7698.6921
RMSE	129.8270	76.775666	87.742191

RMSE_SW	113.0840041	67.30782095	45.58062906
SSIM	0.217292, 0.667591	0.653790, 0.707731	0.5836152, 0.6845124
UQI	0.6143681	0.729776	0.627362
MS-SSIM	0.31187678187	0.501600148852	0.4649440077
ERGAS	421973.40116	121515.590870	275962.4941
SCC	0.0170458	-0.005022	-0.0777906
SAM	0.795673	0.9099325	1.110519
VIFP	0.2793599	0.232960	0.281539
PSNRB	9.1168440	5.742390	10.6591124

Table 5 : output for image 3 with quality metrics for ESHE, RMESIHE, claRMSHE

QM Parameters For Image 3	ESHE	RMSHE	claRMSHE
MSE	3789.981606	3833.6970185	7698.692119
RMSE	61.56282	61.91685	87.742191
RMSE_SW	28.6202533	28.78455	45.58062906
SSIM	0.5836152, 0.6845124	0.279591, 0.762191	0.565273, 0.718116
UQI	0.6143681	0.618640	0.426449
MS-SSIM	0.501600148	0.071623794	0.658928
ERGAS	1012727.073	155787.01130	155717.90543
SCC	0.0170458	-0.002775	-0.002754
SAM	0.827387	0.889752	0.897358
VIFP	0.2793599	0.048734	0.048861
PSNRB	9.1168440	11.53138	10.87312

Table 6 : Output for image 3 with quality metrics for R-ESIHE, RS-ESIHE, WTHE

QM Parameters For Image 3	R-ESIHE	RS-ESIHE	WTHE
MSE	10525.559	5123.7716	11815.41348
RMSE	102.59414	71.58052587	108.69872
RMSE_SW	85.246131	36.33088817	99.48488928
SSIM	0.177543, 0.455830	0.53116, 0.716580	0.566643, 0.720472
UQI	0.212141	0.618894	0.1742202
MS-SSIM	0.3460720	0.709533774	0.640070877
ERGAS	445686.87	121515.590870	280265.4211
SCC	-0.000177	0.020476	-0.0014917
SAM	0.753232	0.9099325	0.677614
VIFP	0.058564	0.141634	0.0766659
PSNRB	7.045328	11.60782	6.526448

Table 7: Performance evaluation of image enhancement algorithms

QM	Image 1	Image 2	Image 3
MSE	ESHE	RS-ESIHE	ESHE
RMSE	ESHE	RS-ESIHE	ESHE
RMSE_SW	ESHE	RS-ESIHE	ESHE
SSIM	WTHE	RS-ESIHE	WTHE
UQI	ESHE	RS-ESIHE	RS-ESIHE
MS-SSIM	RS-ESIHE	ESHE	RS-ESIHE
ERGAS	RS-ESIHE	RS-ESIHE	RS-ESIHE
SCC	RS-ESIHE	ESHE	RS-ESIHE
SAM	ESHE	WTHE	RS-ESIHE
VIFP	RS-ESIHE	ESHE	ESHE
PSNRB	ESHE	WTHE	RS-ESIHE

Performance evaluation based on the digital Images taken in dim conditions, including evening dark environment to test the reliability of the low exposure imaging method. Analysis of the visual results of fig. 8–14 shows that RS-ESIHE, ESHE & WTHE algorithms are best suited for especially in low light conditions.

5. CONCLUSION

This paper presents an effective way to increase the contrast of digital images. The histogram of the input image has been modified with a new feature to avoid information loss during image processing. The new algorithm is designed to make dark areas of the image high and bright areas low. A non-linear normalization transformation is to obtain a wider dynamic range of the low illuminated of the output image. After applying the proposed method, the sharpness of the image with non-uniform lighting was clearly improved. As a result of the experiment, it can be seen that the RS-ESIHE has superior image enhancement performance to other latest methods. This RS-ESIHE method is suitable for Adaptive image enhancement to visualize the low light and dark images which is suitable for unmanned platform and can be implement in mobile robot and drone applications. Analysis of the results shows that for these kind of images, RS-ESIHE is selected as the best Adaptive Enhancement method to be used. However, ESHE and WTHE is quite nearby to the RS-ESIHE. These methods are better suited to extract the information content of an image because it gives better results in terms of average information content.

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Computational Approaches for emotion detection in face and text

Meghashree C, Manasa M A, Madhuri Vijay, K B V M Madhusudan Reddy and Anooja Ali

School of CSE, REVA University, Bangalore, India

Abstract.

A method of playing music to a person's mood requires interaction with the user. Moving to computer vision technology will allow the mechanism of the software. To attain such, a design is handed down to categorize the human emotions and give a piece of music based on the emotion found. It eliminates the time and effort of searching for a song on the current state of a person. In this proposed system, the expressions of a user are recognized by pulling out the characteristics of the face using the PCA technique and fisher face classifier. A computer built-in camera is worned to grab a person's facial expressions, which decreases the design cost of the system. It also has a text emotion detector. Chatbot recognizes the emotion of a person through the users' text and recommends songs accordingly. Sentiment analysis methods are used to detect the emotions in text.

Keywords. Facial Feature Extraction, Expression Recognition, Fisher face classifier, PCA algorithm.

1. INTRODUCTION

In the present busy life, with evolution in the fields of technology many different music apps are designed with attributes such as rewinding, forwarding, and streaming music using multicast streams. In spite of the fact that these technologies only satisfy the needs of a person, the user must manually search for the track from a huge set of songs. The intention of this system is to design a software that can recognize the emotion and suggest or play a music track based on the emotion caught. Here we have two modes of recognizing the emotion. The first mode is using facial expressions and the second mode is using the text. Here we use the fisher face method to extract the facial features and sentiment analysis to detect the emotion using the users' text.

Emotion mode and Text mode are the two different ways where the user can switch to any mode in his/her comfort. Here we recognize the four basic emotions- Happy, Angry, Sad, and Neutral. We have found its applications in different fields such as Human-Computer Interaction (HCI), it is used in therapeutic approaches in healthcare, etc.

2. LITERATURE SURVEY

V.P Sharma et al. [1] proposed a system that uses a neural network approach for both emotion detection and song recommendation. They have used HAAR cascades for face detection, six layers of the CNN model for emotion detection, and another CNN model for music recommendation based on emotions.

Y. Yaslan and Shreya L [2][3] considered emotions using signals from wearable physiological sensors. The emotion is classified by the device that consists of galvanic skin response (GSR), photoplethysmography (PPG) sensors, and encephalography (EEG). Data Fusion techniques are used for combining data in PPG and GSR sensors. Emotion intensity will be shown on the arousal-non-arousal scale. The signal from PPG and GSR, sample, and features are extracted, target emotion is predicted, and the recommendation system song is sent to the player.

A. Alsaedi et al. [4] incorporated the Principal Component Analysis (PCA) and Viola Jonze algorithm for emotion recognition and song recommendation. The specific playlist is played based on the subject having positive or negative emotions that are being detected. At first user image is captured and using the Viola-Jones algorithm face is detected. they use PCA for emotion detection and based on the detected emotion a playlist will be provided to users where they can choose from music clips.

Joshi et al.,[5] considered Long Short-Term Memory (LSTM) and Convolution Neural Network (CNN) for detecting emotions. The system takes text or facial expressions as input from the user. The features are passed through CNN, LSTM, CNN-LSTM, and LSTM-CNN. They have used a third-party Music Service API. Shaikh et al., [6] proposed a system where emotions were identified by a chatbot. This chatbot identifies emotion by asking some general questions and recommends playlists accordingly. They used Singular Value Decomposition (SVD) and Nearest Neighborhood Model. For song recommendations they used Last.fm API and for emotion analysis they used IBM Tone Analyzer API.

S. Shivanand et al., [7] discussed a chatbot that recommends movies and music depending on the mood of the person. They have used HaarCascade Algorithm for detecting users' faces and CNN algorithm to detect emotion from features extracted and a Rule-based chatbot. The system has three modules such as Chatbot, Mood detection, and Music/Movie recommendation. Haar Cascade is an object detection algorithm to identify faces in a real-time video or an image. By using the algorithm face can be detected quickly. Convolutional Neural Network is used for object or image recognition and classification. Convolution is an operation performed on two functions that produce a third function that expresses what is the shape of one modified by the other. CNN consists of different layers that generate different functions which are passed on to the next layer. The same recommendations are considered in [8].

Krupa et al., [9] proposed a system that uses two input CNN and two approaches for detecting the emotion of the person, one way is by semantic analysis and the other way is through facial landmarks. They have used the CNN algorithm for classifying facial expressions. The chatbot takes text or voice commands for this it uses Google's text-to-speech (TTS) and speech-to-text API for more interaction. The music recommended is from predefined directories or YouTube API.

Deshmukh et al., [10] described the emotion recognition system in various phases. The emotion detection phase consists of normalization, training, capturing, and classification, and then the feature is selected. Once the feature is selected and emotion is detected, the song is played accordingly.

Sushmita et al.,[11] considered a system that uses the Euclidean Distance Classifier and Principal Component Analysis (PCA) to pull out the facial characteristics. At first, the image undergoes pre-processing technique and resizes the image, then the images are selected for the training set, thus finding the average face, and a matrix is created. Covariance of the matrix is found and then eigenvectors of the covariance matrix are calculated, Eigenfaces will be calculated, then Euclidean distances between image and eigenfaces are calculated and the minimum distance is found. The output will be an image of Minimum Euclidean distance and a music track is played.

A. Bhardwaj et al.,[12] incorporated a system where they have used EEG signals and Independent Component Analysis (ICP), Machine Learning techniques like Linear Discriminant Analysis (LDA), Support Vector Machine (SVM) where they classify EEG signals to various emotions. Their model has different phases such as Data Acquisition, Segmentation, Feature extraction (Energy, Power Spectral Density), Machine Learning techniques (SVM, LDA), and Emotion detection.

The literature survey of the existing web app can be summarized in Table 1

Name of existing web app	Problem Identified	Advantages	Ref. link
Spotify	No face and text emotion detection Manual browsing required Need internet	Easy to access Large songs collection	https://www.spotify.com/in-en/
Gaana	No face and text emotion detection Manual browsing required Need internet	Easy to access Large songs collection	https://gaana.com/
Hungama	No face and text emotion detection Manual browsing required Need internet	Easy to access Large songs collection	https://www.hungama.com/
Wynk	No face and text emotion detection Manual	Easy to access Large songs collection	https://wynk.in/music

	browsing required		

3. METHODOLOGY

In the proposed system, the user needs to select the mode initially. The available modes are face emotion and chat mode. Fig 1 represents the architecture. The flow chart shows an overview of the system and explains the functionality.

- For training the dataset in emotion mode we have used the fisher face algorithm. It is dependent on the reduction of face space by the PCA technique and later applies the LDA approach. Principle component analysis (PCA) is a dimensionality reduction method for large data sets. Linear discriminant analysis (LDA) helps to find a linear combination of attributes to separate two or more classes.
- API Stage: Once the image is captured, the system sends the image capture to SDK. Input is processed and the image feedback is sent to the system.
- Recognition Stage: The system receives the image information and recognizes the emotion based on the features extracted by the face. This emotion is again sent to the database to get the emotion playlist.
- Display Stage: Here, the songs are organized, and the user can also select a song manually from the list displayed. The user has the option to forward, remove, add, and modify the playlist.
- If the user is not interested in giving his/her face for emotion detection, he/she can switch to text mode.
- The chatbot asks some general questions to the user. For each response the person gives, the score related to the response is considered for knowing the entire emotion of the person, then the chatbot reacts based on the polarity of the sentence. Polarity in natural language processing is used in grasping the sentiment of a statement. The polarity score is a floating value with the range [-1.0, 1.0].

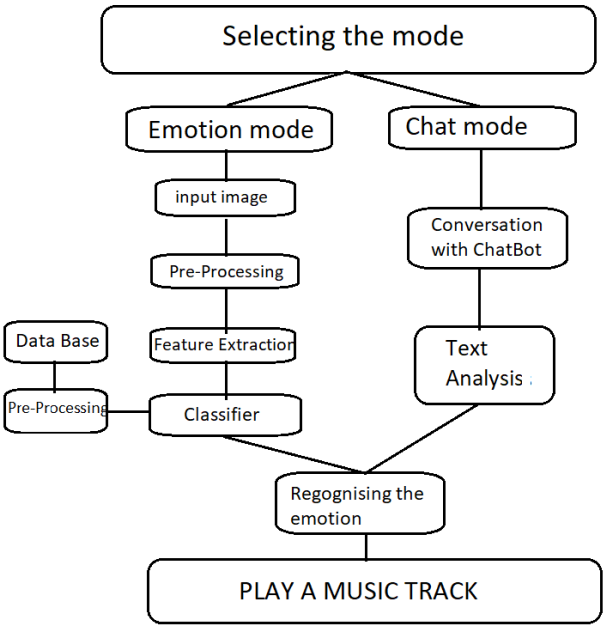

Fig. 1: System Architecture

4. DATASET

As for our study, we have used facial emotion detection in Fisher face which will work with the trained models. This will let the user choose the dataset according to their usage. If a large dataset of 26-32k is taken, then it gives good accuracy and, in this case, the users are few people. So, in these conditions, if we use a dataset of 410-460 images as input according to the user then even, in this case, we get a very good accuracy for a small quantity of dataset and occupies low memory to work. In such conditions, if we consider some dataset with around 150-200 samples as input according to the user then it also gives us a better accuracy with the advantage of low quantity dataset and low storage on memory for operation. Here we used the Extended Cohn-Kanade dataset as we need to make it to train our model.

To train the model, we used a code in Python that collects all the images classified from the folders and matches them with the emotion. This data is stored in a dictionary. We use the .train method for training the model.

The dataset we have used consists of 5,876 labeled images of 123 individuals. It has Neutral to peak expressions with similar backgrounds, in grayscale, and with 640x490 pixels. It consists of seven expressions such as anger, happiness, Neutral, sadness, disgust, surprise, and fear. Using this dataset, we observed four emotions in our study: anger, happiness, sadness, and neutral.

5. EXPERIMENTAL RESULTS

The software requirement includes an Operating system with Windows 7 or above. The front end is designed with Front End: HTML, CSS, JS. The proposed system is implemented in python with PyCharm Community Edition 2021.3.2 as the iDE. It requires a hard disk of 100 GB and RAM of 4 GB.

The following, Fig 2 shows the result screenshots of emotion mode. It shows the few song sequences selected based on facial emotion. The following shows the chat with the user in fig.3.

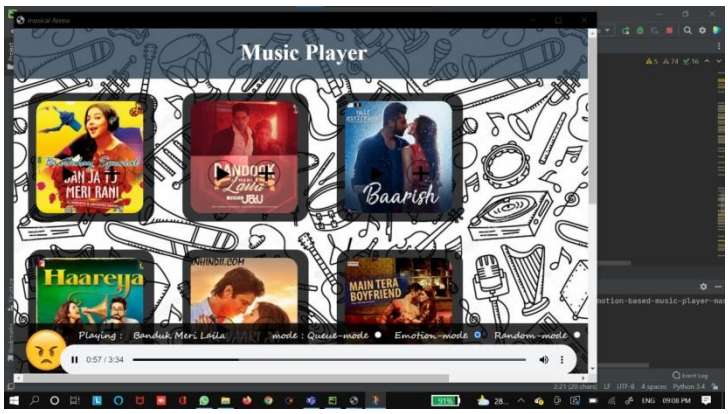

Fig 2: Sample emotion detected, and the song selected

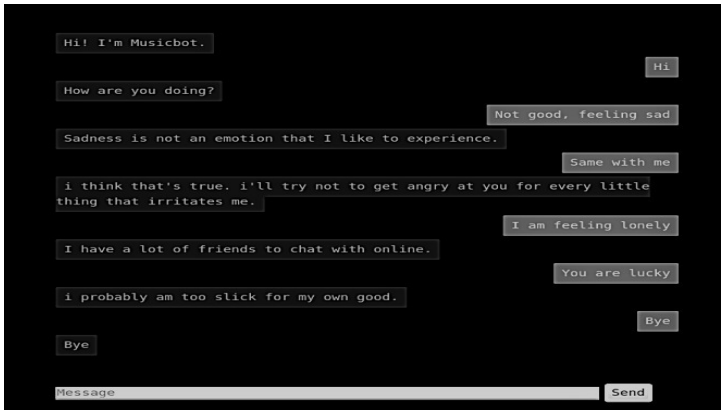

Fig 3: Chat session performed with the user

6. OBJECTIVES AND APPLICATIONS

The main aim of developing this system is to build Human-Computer Interaction. It also provides a proper and accurate Emotion Detection. Playing music is associated with improving the mood of the user. Building a website with a good user interface and functionality.

The applications include Human-Computer Interactions. It can be used by Medical – Psychiatrists, Autism Spectrum Disorder. music is the best treatment for any mental disorder. Music is the best treatment for any mental disorder. It takes advantage of music's inherent mood-lifting properties to aid individuals in improving their mental health and overall well-being. It can also be used in Autonomous Vehicles to improve the mood of the passenger

7. FUTURE SCOPE

Emotion recognition has high scope in most areas such as human-computer interaction, biometric security, etc. So, it gives awareness to artificial intelligence or machine intelligence that utilizes variously supervised and unsupervised machine-learning techniques to imitate the human brain.

The scope for the developing project would be to design it for handsets. To implement a system that helps in the music treatment to give treatment to the sufferers. who are facing mental illness, trauma, and acute depression. It can also be used in detecting the current mood of a person who is physically challenged.

8. CONCLUSION

With the growing combination of computer interfaces and computers in our daily lives, the rise in the necessity for computers to recognize and make a response to human interaction and behavioral signals of mental states and emotions. The expressions in the images and texts are significant. In certain, the features that match the cognitive and affective states of the mind which are not a slice of the emotions set. This is demanding because of behavioral cues' inherent inference of hidden mental states. In this research, facial expressions and text expressions are considered for the detection of emotions. The system is not dependent on elements like age, ethnic group, gender, background, and also birthmarks. The system hopes to be very much promising and designed for users going through mental illness during their working hours or anything by providing them music treatment.

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Spoken English to Indian Sign Language Translator

[1]Mahendra Nath Reddy, [2]Vishakh V Badami, [3]Dinesh B, [4]S P Chetan Kumar, [5]Kanaiya V Kanzaria

Authors Affiliation, [1]mahendranathreddy.e@gmail.com, [2]vishakhbadami@gmail, [3]ssdinesh.345@gmail.com, [4]Chethan9441@gmail.com, [5]kanaiya.vk@reva.edu.i

Abstract.

Normal and hearing disability people's communication involves the use of sign language gestures. The medium of communication between hearing, speaking disabilities and normal people to convey their thoughts and feelings is Sign Language. But often, people have a hard time understanding hand gestures made by the people with disabilities because they don't know the interpretation of those sign language symbols. Usually, when a normal person wants to communicate with a deaf community, it is very necessary to translate those spoken words into Indian Sign Language Gestures because they find it very difficult if they are unaware of the meaning of sign symbols. To help people with special disabilities and to communicate effectively with those around them, a system that translates a normal person's spoken words in English into text and Indian Sign Language (ISL) gestures is necessary. English letters from(A-to-Z) have been proposed in this paper. This approach takes spoken English sentences as input, transforms that voice clip into textual characters, and shows predefined appropriate Indian Sign Language gestures. Communication between regular people and deaf persons is simplified using this system.

Keywords. speech-recognition, text-gestures, speech-to-text, google-speech-api, python3.

1. INTRODUCTION

Sign Language recognition relies on gestures. This translator can be implemented in numerous elements of society. The strategy for communication between incommunicative and general folks is signing, which is an abstract entity that will be mapped to language communication whose origin depends on the "Sign" or "Gestures."

There are many one-of-a-kind signal languages used across the world, every with its personal vocabulary. This is due to the fact signal languages have been evolved certainly with the aid of using human beings belonging to one-of-a-kind ethnic groups.

Examples of diverse sign languages include Indian Sign Language (ISL), American Sign Language in North America (ASL), British Sign Language in the United Kingdom (BSL), and South Africa. Sign language (SASL). We advise an Indian Sign Language based translator that serves as an interface among the Deaf-dumb network and the overall public.

The Indian Sign Language has a low literacy rate, which is thought to be due to the

following factors:
1) Insufficient ISL interpreters
2) The ISL device is not available.
3) There aren't enough studies on Indian Sign Language.
Hard-of-hearing people use Indian Sign Language (ISL), a visible language focused mostly on gestures and motion, as their major mode of communication. Indian Sign Language is the most widely used sign language among the Indian subcontinent's deaf community.
In addition to fingerspelling, ISL includes gestures at the sentence level. For sentences, which does not have direct sign language conversion, for which the signer is unaware of the movements, and for interpretation of a particular word, fingerspelling is utilised.
Hand gestures in Indian Sign Language are classified into two groups: static and dynamic gestures. The English alphabets of static Indian Sign Language hand gestures (A-Z) are showed in Fig. 1.

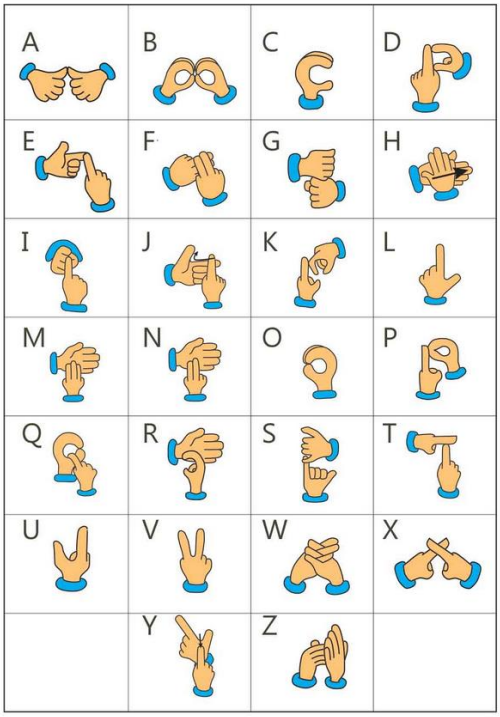

Fig 1: Poster of the Manual Alphabet in Indian Sign Language (ISL).[6]

People with speech and hearing disabilities tend to isolate themselves and feel lonely because they have difficulty talking to others. This has a significant impact on their lives. Because of the above-mentioned difficult scenarios that specially challenged people confront, this research proposes an automatic real-time system that can assist in translating spoken English phrases into Indian Sign Language gestures.
This translator enables people with disabilities to communicate with others successfully. Speech to Gesture translation is performed using the described methodology. We used the Google Speech Recognition API to translate spoken words in English to ISL gestures. This study focuses on the most accurate translation of

spoken English words to Indian Sign Language movements as accurately as feasible.

2. LITERATURSE SURVEY

Paras Vij et al. [1] designed a two-phase sign language generation technique The initial phase involved pre-processing 2 Hindi Sentences and translating them into ISL grammar. WordNet and Dependency Parser have been combined to complete this task. In the Dependency Parser, dependency graphs represented words and their relationships between head words and words that affect those heads. HamNoSys was utilised in the second phase to translate this syntax into respective Sign Language. The symbols generated were translated by SIGML to form XML tags. A 3D rendering software can then read the XML tags form.

MS Anand et al. [2] proposed a double phase ISL conversion system. In speech-to-sign module the input voice was fed to the noise removal sub-module. After that, the output was sent into a speech recognizer, which decoded the input voice and converts to phrases sequence. A rule-based technique was used to turn the sequence of phrases into a sequence of sign symbols in a natural language. Finally, using the sign animation module the animated signs were displayed with text annotation respectively.

Ankita Harkude et al. [3] built a system that takes input as voice, transforms that to text, and a set of pre-labelled Indian Sign Language Pictures or GIF's are displayed. Communication between normal and deaf community is made easier using this system. After then, all the words in the sentence are compared to words in a lexicon that includes images and GIFs that represent those words. synonym's will be used , If the terms aren't recognized. The system has a set of gestures that are pre-labelled.

Supriya Pawar et al. [4] proposed a camera-based hand gesture recording system. Image processing of the captured gesture is performed. Then, sign recognition and conversion of signs to text and voice are done. The final result is amplified voice equivalent to each processed gesture. This project aims to develop a useful tool that uses gesture recognition to reduce communication barriers between the deaf and dumb community. This project is a prototype to verify the feasibility of gesture recognition by image processing.

Dhivyasri et al. [5] proposed Support Vector Machine, for gesture to text conversation and for speech to gesture conversion, Google Speech Recognition API were used. The proposed application can read Indian Sign Language. As a result, a more valid sign language interpreting application was created.

3. METHODOLOGY

Our goal is to help people who are with hearing disability. There are many sign language projects that transform by sign language symbols as input to output as text or voice. However, voice/speech-to-sign language translation systems are developed hardly. These kinds of systems can be useful for both ordinary people and mute people. This study will introduce a new approach that takes spoken English words or phrases to sign language translator. It takes spoken English words as input, searches with Google APIs, displays text on the screen, and finally, with a short delay, outputs the character sign gestures of the input specified in ISL (Indian Sign Language). This work did not focus on facial expressions.

3.1. Procedure

The user's speech is received through the device's microphone and passes through the voice-to-text model. The textual content generated from the speech is then analyzed to extract letters from the word. Then speech recognition using Google Speech api is done, later the input spoken characters are mapped with predefined labelled sign gesture images and displays the relevant sign symbols respective to the characters sequence of the speech received with a certain delay.

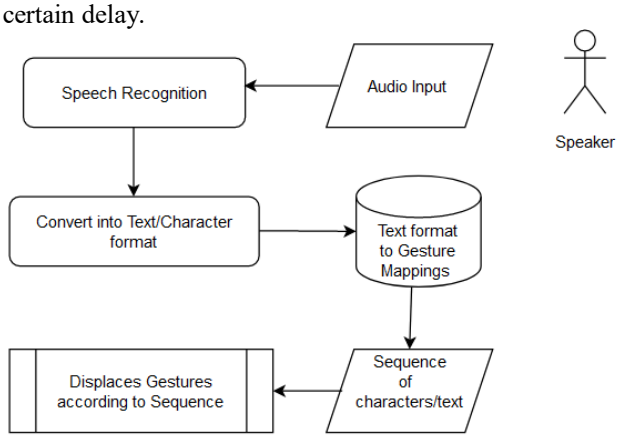

Fig: Block Diagram

3.2. Algorithm

Step1: Start
Step2: Getting the Input
1. Listen the Speech (Spoken English) using Microphone.
Step3: Recognize the Speech.
Step4: Convert Spoken words to Text/characters.
Step5: Text and Characters Detection.
1. Display the Letters of the Word/Phrase.
2. Display the Visual of the phrase with some delay of Actions.
3. Repeat all the steps from Step 3 and continue till the Speech Ends.

4. If Error in Step 2, That is if no Speech Detected then display error message "Sorry, I did not get that, please try again".

4. IMPLEMENTATION AND RESULTS

The appropriate Indian Sign Language symbols are generated as output from the received spoken English sentences as input. This system's output is a constant display of ISL gestures of the input speech characters respectively.

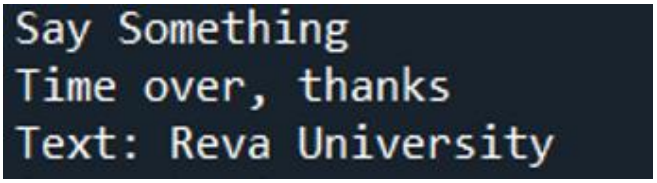

Fig2: Displays the words extracted from the input

The Google Speech-to-Text feature uses a Neural Network Model for converting audio into text. An active internet connection is needed for this. The utterance time is set to 7 seconds. That is, the user has 7 seconds of time to speak out the words as input into the microphone. Then Google speech recognition API converts the input voice to text. Next, the output is the set of Indian Sign Language gesture that are equivalent to the characters of the text.

Figure 3 shows a screenshot of the implementation of the voice gesture conversion for the word "Reva University".

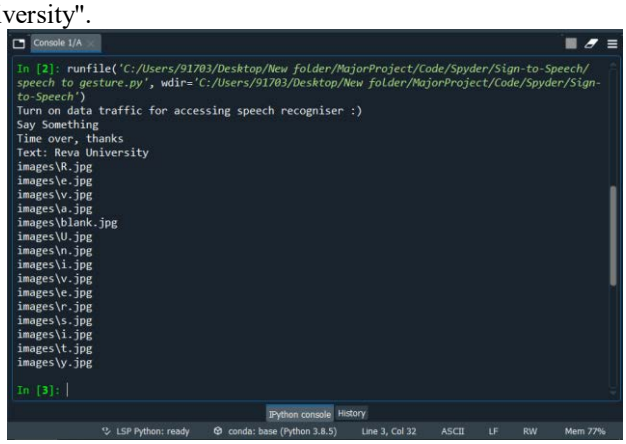

Fig 3(i): The characters in the spoken speech

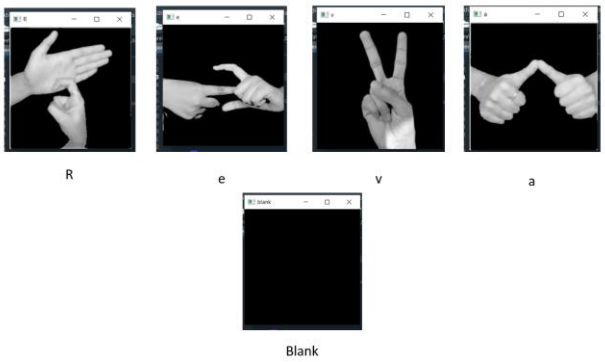

Fig 3(ii): Displaying relevant ISL Symbols for the text Reva and Blank.

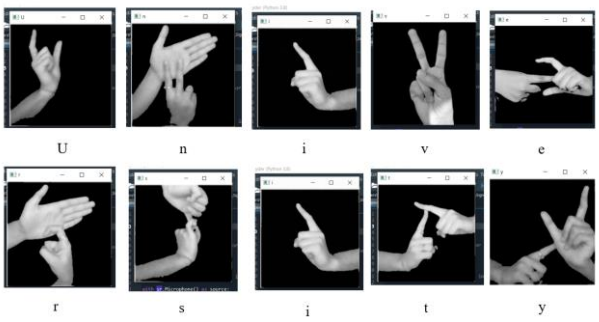

Fig 3(iii): Displaying relevant ISL Symbols for the text University.

5. ACKNOWLEDGMENT

We would like to thank REVA University, School of Computer Science and Engineering for providing a good time to work on this project. We would like to express our gratitude to , Department of Computer Science and Engineering for his encouragement, support, and ongoing mentoring on this project work.

6. CONCLUSION AND FUTURE SCOPE

Our paper's main aim is to underline the need of Indian Sign Language Translators and to propose a practical method for converting spoken English phrases into Indian Sign Language symbols. Many languages, such as ASL, have benefited from extensive research, whereas ISL has received less attention. The development of this proposed method will aid in bridging the communication distance among the hearing and speech challenged community and others. In many public areas, a sign language translator is quite useful for effective communication between general and impaired persons.

The goal for future is to build an end-to-end system that converts Indian Sign Language Gestures to Speech with at most accuracy and then integrating both Sign language Gestures to Speech and Speech to Sign Gestures as one application. We also aim to expanding the project by incorporating facial expressions as well.
This application/system is beneficial for two-handed Sign gestures in both directions for efficient communication between disabled and non-impaired people.

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Real-Time Power Monitoring (Cloud) and Control (Two-way, Manual and web application) using IoT

[1]Jebathurai M, [2] Ashok K Patil

Authors affiliation, [1]jebathuraiuit@gmail.com,[2]ashokk.patil@reva.edu.in

Abstract.

Presently most equipment and machinery in the digital era run on electricity, where energy is a need for modern living with its demand expanding day by day. Electricity has a critical part in all lives and our civilization cannot run without it. Food, cooling, heating, payment transactions, the stock market and the internet runs on electricity only. The power firms generate energy based on historical data on power usage, thus making energy monitoring very crucial. Power is always generated with reserve capacity by the power producing firms. Electricity demand fluctuates based on the time of day and season. Most significantly, storing large amounts of power is an impractical approach and the current solution is ineffective. This research proposes an energy monitoring and two-way (manual and Smart IoT) control system to reduce power wastage. The power supply partial diagnosis system is a novel technique (Optocoupler isolation module) utilized here; without any indication like light or camera, the web user may see the main and utility power supply status, as well as the utility status using the current sensor.

1. INTRODUCTION

Internet of Things (IoT) provides a facility to other technologies and small devices that connect each other and exchange data over internet or other communication networks. In this paper energy tracking and two-way controlling is discussed with the help of IoT concept real-time power monitoring and controlling is achieved. If end user has an internet and browser facility, then he can deploy this service anywhere, as it is hosted in cloud-based web host. The deployed system gives a real-time data to user controlling feature. User also has a lot to know if the power supply is available in supply lines. This proposed system enables simple design and implementation with minimum cost.

Current energy-demanding challenges such as inefficient energy management, squandered power assets and excessive power fees must be addressed in order to fulfil the growing demand for clean, cheap, and sustainable electricity. Currently, energy generation is totally dependent on the near-real-time power demands of electric loads. In this case, keeping reserve strength resources operational all the time to create and provide extra power to meet erratic surges in energy needs is a wasteful and unsustainable strategy. Electric power intake prediction skills are necessary to limit the quantity of energy

squandered by having backup sources operational at all times. The electrical strength intake can be forecasted for the near future using prediction skills, allowing the specified amount of energy to be generated.

The production of electricity is responsible for 42.5% of global CO_2 emissions.

Coal-fired power plants are responsible for 73% of this, generating 950 grams of CO_2 every kilowatt-hour of energy generated vs 350 grams for fuel-fired power plants. Even after accounting for the eventual requirement to decommission ageing facilities, CO_2 emissions from nuclear power stations are only 6 grams. In comparison, coal-fired power plants release 950 grams every kilowatt-hour of electricity generated.

In this project, the IoT device acquires load in ampere current utility from the ACS712 sensor. Knowing the minimal ampere, the load consumed, the status of the utility will be known. The current practice to know the load in ON/OFF or power is available in main line to a person needed to operate the switch ON/OFF in same location. Due to advancement in technology, web interface is developed to know or check whether the power is available in the main line using optocoupler module and load is switched ON/OFF using ACS712 Sensor, and also control utility power ON/OFF using double pole optocoupler Relay.

2. RELATED WORK

In later days guided efforts are needed, for monitoring and controlling the energy utility load. Now the modern-day advanced technology enables to lessen manual efforts. For example, to switch on/off utility load, some person is needed to manually monitor the application in identical region. Somehow controlling and monitoring is done on huge appliances in industries with smart sensor and controllers. Industrial sensor and controller are of greater cost and it additionally needs non-stop maintenance. Most of energy wastage occurs in small domestic appliances and small-scale industries. Some researchers and developers provided solution using concept of IoT, actual viewing real-time and varying parameters of electricity on their consumer interface.

Based on IoT, energy monitoring and utility energy consumption discussed in this paper focuses on simplest optocoupler relay and current sensor, which is low-cost, as well as a cloud-hosted database to track energy usage. It can indicate the voltage levels at which various electric gadgets and appliances work. It includes an IoT cloud interface that works with any tool that has an internet or browser capability. Also, it can be used in both domestic and industrial settings.

The created model shows real-time energy consumption by load, and a real-time load log is kept in a cloud hosted web interface. It also offers the capacity to track daily predicted consumption to a cloud hosted database and send load relay-switch on/off instructions to the control unit via an integrated IoT cloud interface.

3. PROPOSED WORK AND IMPLEMENTATION DESGIN

3.1. Block diagram

In this block diagram, we can see the architecture of the suggested paradigm.

The ARDUINO R3, cloud-hosted database, optocoupler relay module, utility load, IoT interface, two-way manual switch, ESP8266 Wi-Fi Shield, ACS712 current sensor and optocoupler relay switch module are the components.

The following is the role of components in this device.

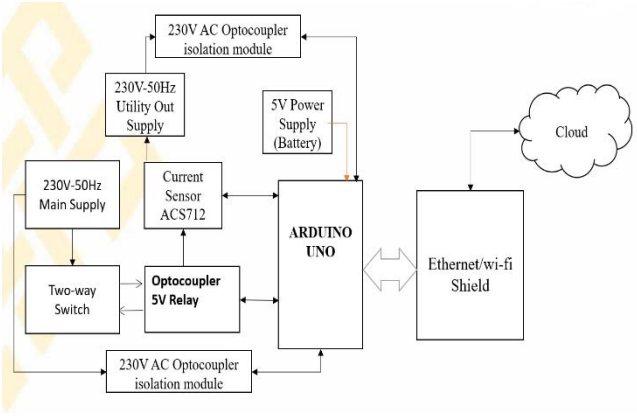

Fig. 1. Block diagram of Real-Time power monitoring with two-way control

Arduino UNO R3 is main control circuit board, which runs on 5V power supply and a small sized battery power bank is used. 230V AC Optocoupler isolation module is used to check the presence of power supply in main line and utility line. ESP8266 Wi-Fi Shield is used to establish wireless communication between Arduino UNO R3 and internet which connects through Wi-Fi AP with ISP connection.

In industrial, commercial, and communications applications, the ACS712 sensor provides solutions for AC or DC current detection. It is used for sensing AC current here. Optocoupler relay and two-way switch used to change a power state in utility supply line.

1) Arduino UNO R3: It is an IoT developed open-source board, with ESP8266 Wi-Fi Shield piggybacked for wireless internet access. It fetches an analogue signal from ACS712 sensor and receives a digital input from 220V AC optocoupler isolation module. It controls relay on/off, performs calculations and finds the utility average consuming ampere per second. It sends data to cloud hosted database for further analysis.

2) Database and web hosting in the cloud: The hosted database and web pages, provide a high-speed connection and high availability. Due to high availability user can get access to this service any time and from anywhere. It is used to store a utility log details in each and every action and it gives the user interface to access stored utility log data and control the utility.

3) Optocoupler Relay Module: This module, also known as an interface board, is made up of 4 sets of binary actuators. It serves as a 5V electrically operated switch known as a relay. Each relay in this module is used to address one load that runs on AC supply with a maximum voltage of 240 volts. It uses the Arduino board to carry out switching commands on loads received over the internet.

4) 230V AC optocoupler isolation module: It is used to find a 230V AC supply existence in power supply lines.

3.2. Hardware Design

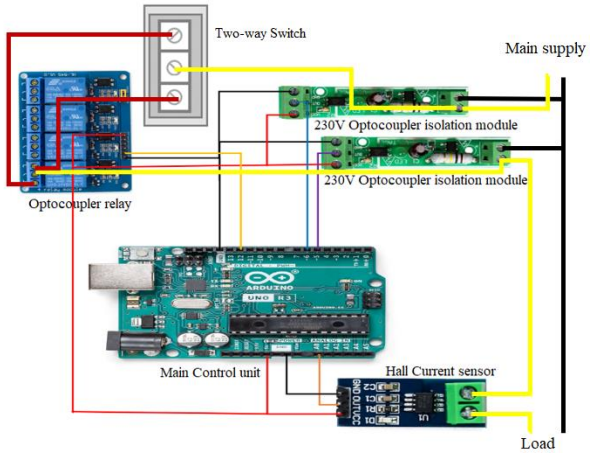

Fig. 2. Hardware design

In Arduino UNO R3 we have 14 Digital I/O pins, and 6 Analog input pins. Digital Pin 12 is used to control Optocoupler relay, and Digital Pin 5 and 6 gets status of power in utility and main line. Analog input pin A0 is used to acquire a value from AC712 sensor.

ACS712 Current sensor

The ACS712 provides cost-effective and precise AC or DC current sensing solutions for industrial, commercial, and communications applications.

For the client, the gadget bundle will be straightforward to use.

Common applications include motor control, load monitoring and management, switched-mode power supply and excess current fault avoidance.

The gadget is made up of a linear Hall sensor circuit and an accurate and low-offset copper conduction channel near the die's surface.

The magnetic field formed by the applied current flowing via this copper conduction line

is used by the integrated Hall IC to calculate a proportional voltage. The magnetic signal is kept close to the Hall transducer, which improves the accuracy of the device. The precision-configured chopper-stabilized BiCMOS Hall IC has a low offset.

3.3. Working Principle

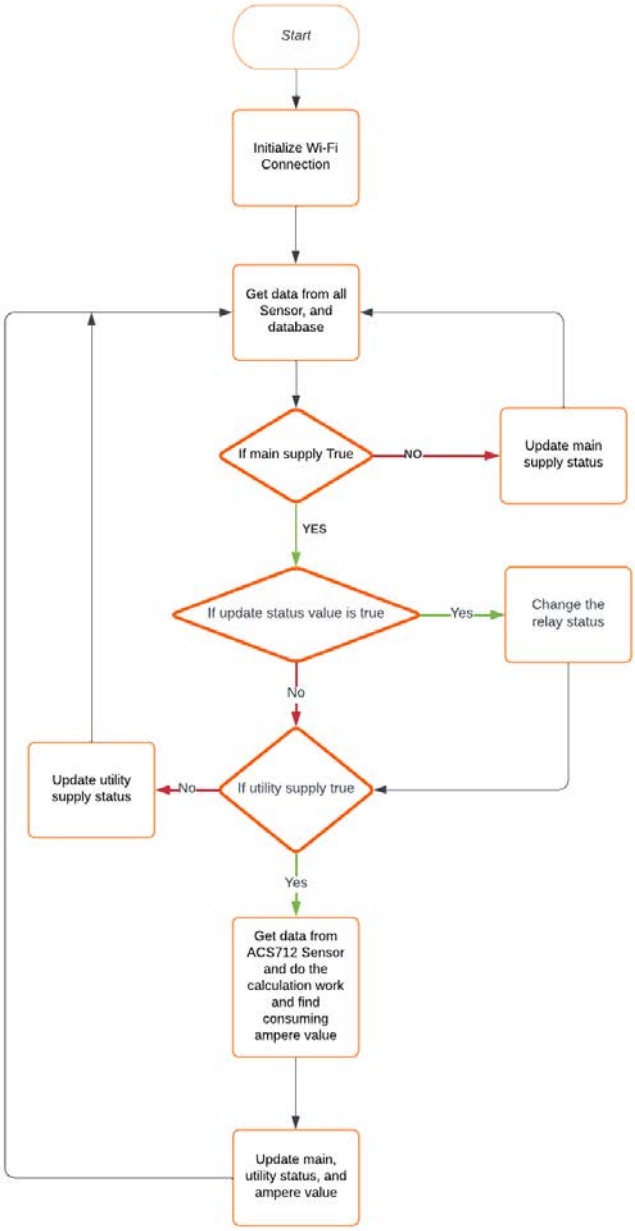

Fig. 3. Flow chart (main control unit)

If the Wi-Fi connection is successful, the Arduino gets data from all of the sensors, checks the main supply status, then the utility line status and only if the utility status value is true,

it fetches an ACS712 sensor output signal to perform the necessary calculations in determining the utility average consuming current value in ampere.
It also gets data from the database and checks the utility supply line status. It changes the relay state to normally open or normally close, if it contains update instructions for the relay.
The calculated value and sensor values are stored in database for monitoring this program procedure in a continuous loop. The stored utility log data will be used for feature report analysis, and it helps user to know energy usage.

The database procedure for utility consumed power in unit (watt) is described in steps. First it will check completed meter record, data start and end time. Then it will calculate duration of utility used and its amperage. Using available data the need to find an ampere used in a minute is arrived at.

Convert Amp hour to Watt hour (Ah to Wh)

Here's the equation: Formula is (Ah)*(V) = (Wh)

3.4. System Implementation

ESP8266 Wi-Fi shield is piggybacked with Arduino base board. With the connecting wire, relay module is connected to two-way switch and relay 5V VCC and GND connected to Arduino base board. 220V Optocoupler isolation module is connected to main supply line, another one is connected to utility supply line and 5V VCC and GND connected from Arduino. ACS712 current sensor is connected in serial to utility power line, 5V VCC and GND is connected from Arduino. Output of ACS712 sensor is connected to A0 analogue pin in Arduino board. For testing 60W bulb is connected to utility output power line.

Fig. 4. System prototype

3.5. Communication Flow

Control Unit:

Here Arduino UNO R3 works as a main control unit, with ESP8266 Wi-Fi shield enabling an Arduino board to connect to the internet using the IEEE 802.11 wireless standard (Wi-Fi). So ESP8266 is attached with the Arduino UNO R3 main Circuit Board. This ESP8266 Wi-Fi Shield establishes an internet connection between Cloud host through Wi-Fi AP. The control unit has sensors and relays to make communication between utility and Control Unit.

Cloud Host:

Cloud host contains Database host and Web host. Database host stores data which is received from Control unit and client program. Web host is an interface and communication bridge between control unit and user interface. Web host have a collection program code to make a communication with control unit and it stores data.

Client Device:

Client Device could be any device with internet and browser facility, like Personal Computer, Tablet and Smart Mobile. Client device retrieves a web page from web hosted in cloud for user and makes a communication through ISP to Cloud host.

4. RESULT AND REPORT

Fig. 5. Web user interface

This web page allows the user to operate the utility and displays the status of the main, utility power supplies and control unit, as well as the utility consumption current in amps.

Fig. 6. Clamp meter

Test case was also tested with a clamp meter. Clamp meter result and control unit test case result were same in web page shown.

This report page gives a flexible search date wise. User need to enter start and end date to get duration report. It shows utility start datetime, end datetime, duration, utility used power in watts and total power consumed between users given duration.

START DATE: 08 / 04 / 2022 END DATE: 25 / 04 / 2022 Search

SEARCH RESULT OF GIVEN DATE 2022-04-08 between 2022-04-25

Connected successfully

On Date	OFF Date	Used in Minute	Power Used in Watt
2022-04-09 09:27:39	2022-04-09 09:28:44	1	0.32
2022-04-12 14:54:40	2022-04-12 14:57:02	2	0.72
2022-04-21 21:02:14	2022-04-21 21:04:13	1	0.28
2022-04-21 21:07:41	2022-04-21 21:33:56	26	9.36
2022-04-21 21:57:15	2022-04-21 21:59:02	1	0
2022-04-21 22:01:06	2022-04-21 22:03:50	2	0
2022-04-21 22:05:57	2022-04-21 22:07:52	1	0
2022-04-21 22:24:37	2022-04-21 22:27:05	2	2.08
2022-04-21 22:30:07	2022-04-21 22:31:49	1	1.04
2022-04-21 22:36:58	2022-04-21 22:45:02	8	8.32
2022-04-23 23:11:55	2022-04-23 23:15:58	4	4.32
		Total Consumed Approximately* in Watt	26.440000385046005

Fig. 7. Report page

5. CONCLUSION

This article discusses the use of IoT devices for energy, utility monitoring, and control. The consumer can monitor the power consumption 24/7 in 365 days and also control the power utilization either locally or over the internet, thereby reducing the wastage of power, thus cutting down the electricity bill. The continuous power monitoring log provides a customized day-wise statistic report on utility performance.

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Open & Fair Online Marketplace

[1]Dharshan K, [2]Abhishekh Singh, [3]Harsh Abhinandan, [4]Badrinath Samanth, [5]Geetha B

Authors affiliation, [1]dharshan0011@gmail.com,[2]r18cs016@cit.reva.edu.in, [3]r18cit831@cit.reva.edu.in, [4]r18cs074@cit.reva.edu.in, [5]geetha.b@reva.edu.in

Abstract.

Due to the lockdown and economic crisis during the COVID-19 epidemic, all firms selling goods encountered numerous obstacles. However, several big corporations had their own eCommerce divisions and were able to swiftly transition to a fully online manner. Other large companies with appropriate resources were able to get online as well. Micro, small, and medium-sized businesses, on the other hand, were unable to do so fast due to a lack of expertise and resources.

Online marketplaces such as Amazon, Flipkart, and others already exist.The primary issue with them is that the competition is controlled by unfair and anti-trust activities.

This is why we decided to create an open and fair online marketplace, just for MSME businesses, to assist them in moving their operations on the internet. We take care of the infrastructure and technology implementation so that the sellers may concentrate on their primary interest: their business.

1. INTRODUCTION

During the COVID-19 epidemic, all businesses were severely harmed. Big businesses that sell items already had an online eCommerce wing and were able to swiftly transition to a completely online form. Others, with sufficient finances and skills, establish their own eCommerce division. However, there was no open and fair internet marketplace for MSME businesses. Where there was no bias and equal chances were granted. Where they are not suffocated by monopolies. This is why, unlike other online marketplaces, we chose to build a platform that is open and fair, allowing anybody to sell without worrying about the technology or infrastructure required.

CURRENT ONLINE MARKETPLACES

The present marketplaces are dominated by large corporations. There is a great deal of business politics at play. Many complaints have been filed alleging that these marketplaces dominate the market and engage in anti-trust practices. There have also been concerns that their platforms favour and encourage "alpha sellers." Alpha sellers are

organisations who have a tight relationship with online marketplaces in the online retail arena. They have, on the other hand, begun to replicate best-selling goods under their own labels, such as Amazon Basic and Flipkart Smartbuy. One cannot just sell a phone at a lower price while maintaining a low profit margin. Due to business politics, that specific cell phone is exclusively sold by a few retailers. This is the most serious issue. To get a competitive advantage, these huge monopolies engage in several unethical acts.

2. COMPONENTS

Hardware:

Laptop with listed features below:

- i5 processor
- windows 10
- 8GB RAM
- 1TB ROM
- And a smart phone

Software:

- JavaScript
- HTML, CSS
- Node.js
- React.js

3. METHODOLOGY

Anyone may register and post their items in our marketplace. He'll be in charge of his own inventory.
He will catalogue his items or resale products from other manufacturers with the manufacturer's permission.
Anyone interested in purchasing things may go to the site and complete the transaction quickly.
Anyone may sell or purchase without worrying about their data, privacy, or the possibility of us replicating anything.

4. IMPLEMENTATION

For the user interfaces, we utilise React.js as our front-end framework, along with web technologies including HTML, CSS, and JavaScript. For server-side scripting, we use Node.js. Additionally, we use MongoDB for our databases. Aside from this, we use a variety of libraries such as Redux, JWT, and Mongoose. The schema for buyers, sellers, administrators, and goods has been established. Mongoose was used to model them. We've introduced role-based access, which limits each user to certain services based on their rights. Admin has the highest level of access[1].
Our cloud provider will be Amazon Web Services (AWS). We use AWS services such as AWS Ec2 and S3[2].
We also use Figma to create all of our user interfaces. Similarly, we utilise bcrypt to encrypt and salt our users' passwords.

5. FLOWCHART

If the visitor is a new user, he will register, and if he is an existing user, he will login. If he is a seller, he will be led to the seller's dashboard, where he will find all sales and income details. The seller may then add items that he wants to offer by entering product information, which will be put to the catalog. After logging in, if the user is a buyer, he will be taken to the product catalog. He can browse to find the goods he wants. He can examine the merchandise and finish the transaction.

The graphic below depicts the full process:

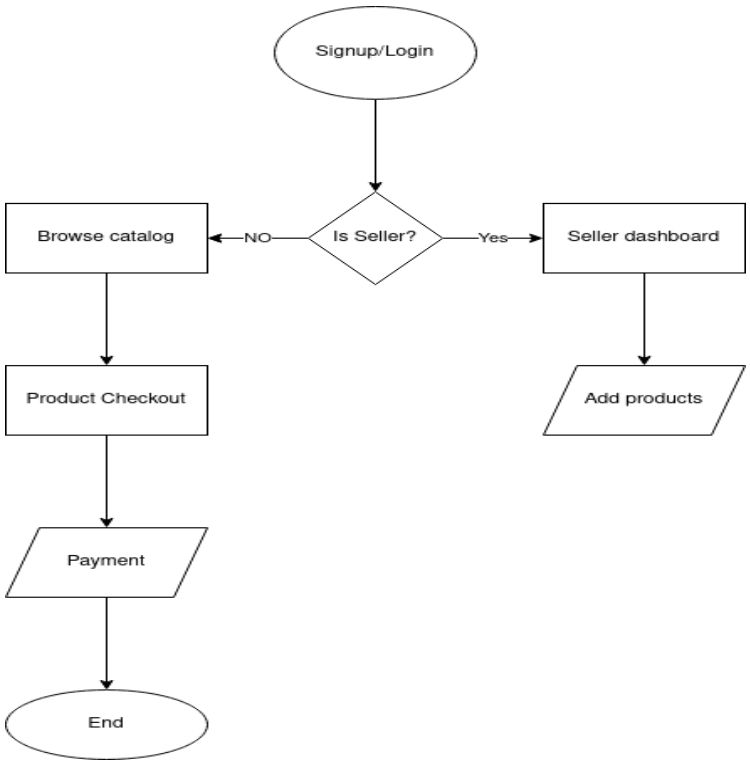

Fig 5: flow chart represents the workflow of the application.

6. CONCLUSION

The platform was created to assist MSME businesses in succeeding by providing an open and fair online marketplace. We handle the hard work of setting up the eCommerce platform for them by constructing the essential infrastructure and technology, allowing them to concentrate on their core business.

7. ACKNOWLEDGMENT

We would like to express our gratitude to Geetha B Professor, Department of Computer Science, Reva University for her strong guidance, ongoing supervision and encouragement during this course of study research which will enable us to achieve the planned target amid a maze of possibilities and failures.

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STOCK MARKET PREDICTION USING MACHINE LEARNING

Sai Bhavya Reddy.T[1], Manju More[2], Sanjana.S[3], Shekamoori Pavithra[4], Shwetha.V[5]

[1,3,4,5] *Student, Department of Computer Science and Engineering,*

[2] *Assistant Professor, Department of Computer Science and Engineering, REVA University.*

Abstract

Stock Market is where trading of offers occurs for openly recorded organizations. The Stocks of the organization which are otherwise called values address a negligible portion of possession in organizations. In the current money world stock exchanging has a lot of significance. Trading of offers occur through stock trade. The most seasoned stock trade is the Amsterdam Stock trade, laid out in 1602. The Network Stock trade, Chicago Board Operations trade, American Stock trade are the top trades in United States. We have the Bombay Stock Exchange (BSE) in India that was laid out in the year 1875 and it is Asia's most memorable stock trade. We likewise have the National Stock trade or NSE [1].

Stock Market Prediction is the cycle wherein the future worth of the monetary supplies of an organization are anticipated. Presently, Almost wherever Machine Learning Techniques are utilized to anticipate the worth of stocks. AI procedures make forecasts precisely taking upsides of current financial exchange lists on preparing the machine with old records. There are numerous techniques in Machine realizing which make forecasts easier [2].

1. INTRODUCTION

In present times, it is difficult to analyze and predict the value of stock markets. Dark pools, high-frequency traders, broker-dealers and the alternative trading systems always have exchanges among them. All of them interact with each other countless number of times in a fraction of second at every instant of a day [3].

It is likewise the consequence of Regulation National Market System incompletely which is otherwise called REG NMS. It is a bunch of rules passed to refine how all recorded U.S. stocks are, by the protections and trade commission (SEC) in 2005. Reg NMS made such that no single body (may be a trade), representative vendor, or any other individual could have unbalanced command over the exchanging action. The fragmentation that exists today is created by the decentralization of the market [3].

Tim Quast the pioneer and CEO of the Modern IR and Market Structure Edge has said that Regulation National Market System needed organizations that were particular, autonomous to associate and share costs and clients, and to make that framework work needs a tremendous measure of information innovation and intricacy and where all the intricacy comes from and what has emerged out of that is what the organizations that contain this environment framework have done to adjust to that.

Factors like Physical and Psychological elements, sane and silly way of behaving and so on influence upsides of financial exchange. Additionally there are factors like market instability, reliant, autonomous to choose worth of a stock on the lookout. It truly challenging to foresee the worth of stocks in light of these variables for any securities exchange expert with high exactness. But, Machine Learning helps in predicting the stock market value by understanding the stock market data through its techniques [1].

With an idea of stock and the stock marketing, let’s understand why people believe that by a Machine Learning model they can predict the stock price. The predictions of values of an observation by a machine learning model are dependent on several inputs that are predictors. The value of an observation based on several inputs that are predictors. The stock market is working similarly, that is, based on several inputs, the stock price fluctuates with these factors. So machine learning has to keep all these factors included and predict the shares of the stock market.

AI at its key level requires the client to give the already existing information utilizing this past information, the AI strategies get prepared and will actually want to investigate and anticipate the future upsides of new information. In this paper, we will utilize AI procedures like straight relapse and long transient memory organization to anticipate the future upsides of stock markets [4].

Linear Regression is a regulated learning calculation to foresee the result of a constant variable. It is an exceptionally well known measurable method to settle AI problems.it can be utilized to anticipate all out income of the organization, climate expectation, Stock cost forecast etc[1].

Long Short term memory (LSTM) is a kind of repetitive brain network for learning long haul conditions. It is ordinarily utilized for handling and foreseeing based on time series information. LSTMs have a chain like structure [5].

2. LITERATURE SURVEY

In the money world stock exchanging is quite possibly the main action.In this task the expectation of financial exchange is finished by the Support Vector Machine (SVM) and Radial Basis Function (RBF) [1].

In securities exchange expectation the point is to introduce the future worth of the monetary loads of a company.AI as such has many models however this paper centers around two generally significant of them like Regression Based model and LSTM(Long Short Term Memory Network Based Model)[2].

There has been a developing revenue in securities exchange forecast advances by means of the utilization of machine learning.This is finished by taking the ongoing upsides of the market subsequent to accepting past stock qualities as the preparation data.In this paper the AI procedures including single layer perception (SLP), Multi-Layer Perception,Radial Basis Function(RBF) and Support Vector Machine(SVM) are compared[4].

Accurate expectation of financial exchange returns is an exceptionally moving assignment because of unstable and non-direct nature of the monetary markets.In this paper it is finished by utilizing the Regression and LSVM based algorithm [5].

Stock value forecast is a significant issue in monetary application.Prediction is generally founded on the specialized investigation of the information.In this paper Stock Index is anticipated utilizing Regression and Neural Network Models under Non Normal Conditions [8].

3. METHODOLOGY

It is truly challenging and complex to anticipate stock market as there are such countless elements that it relies upon. In this paper, we use machine learning strategies called linear regression algorithm and long short term memory network as examined above by relating the past information to the ongoing information. we train the machine with a bunch of information so it will actually want to investigate and foresee any given test data[2].

3.1 Regression Based Model

Regression Based Model is used to predict the outcome of a continuous variable. It depends on the utilization of relapse calculation for anticipating right qualities. The factors that are considered here for regression are date, open, high, low, close, adjusted closing price. Here, date is the cost at which the stock began exchanging when the market opened on a specific date close is the cost of a singular stock when the stock trade shut the market for the afternoon. It addresses the last purchase sell request executed between two dealers. High is the greatest cost at which a stock exchanged during a period. Low is the most minimal cost of the period. Volume here is the aggregate sum of exchanging movement that occurred during specific timeframe. Changed shutting cost is computation change made to the stocks shutting cost, more intricate and exact than the end cost. The changes made to the end cost portrays the genuine cost of the stock on the grounds that the external elements would have adjusted the genuine price [2]

The work is completed on csv organization of information through libraries like pandas, numpy and matplotlib and so forth in jupyter journal.Linear regression is made on the data and predictions are made. Regression utilizes a linear function recently given for foreseeing continuous values [2]

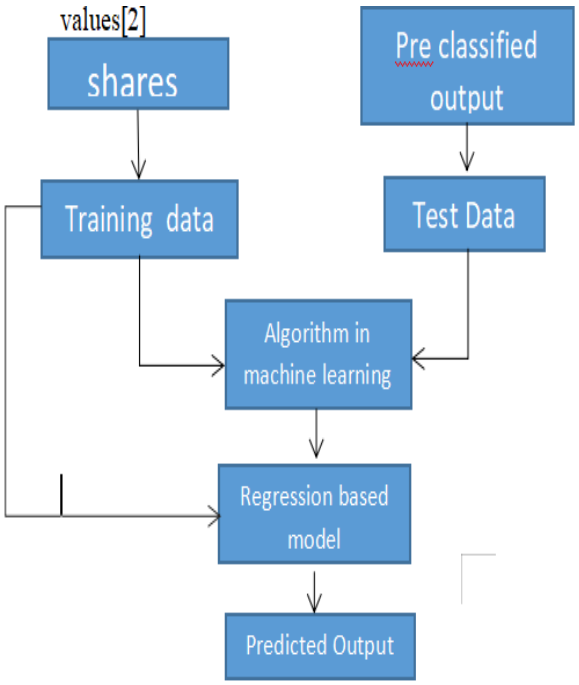

Figure1: Regression Based Model

Regression based model is generally large used to anticipate the continuous values utilizing a few given independent values.Figure-1 minimizes the error function and predicts the given values. Regression generally uses the given linear function to predict the continuous values.

$$V = a + bK + error$$

In the above function, V represents a continuous value; K addressing known independent values and a, b are the coefficients [2].

3.2. Long Short Term Memory Model

Long Short Term Memory Model is a sort of repetitive brain organization to learn long haul conditions. Long Short Term Memory Model is usually used to process and foresee based on time series information. LSTMs have a chain like structure.[2]

By and large, in this strategy initial step is utilized to settle on the data that will be prohibited from the cell in that specific time. Sigmoid capacity helps in choosing it. It thinks about the past state and current info state and registers the capacity. There are two sections in the subsequent advance, sigmoid capacity and the tanh work. The sigmoid capacity settles on which values to let through. In the third step, the last result is chosen. A sigmoid layer is executed, which concludes the pieces of the cell express those come to the result and afterward we put the cell state to the digression work and increase it by sigmoid [2].

Long Short Term Memory (LSTM) is a well versed version of recurrent neutral networks (RNN). Long Short Term Memory and Recurrent neutral networks are not same as LSTM is the advanced version or different version of RNN. Long Short Term Memory (LSTM) involve long term dependencies. Recurrent neural networks (RNN) work to find the relationship between the current and recent information [2].

The issues of customary repetitive brain organization (RNN) which can be the evaporating and detonating slopes can be given an answer for these issues as Long Short Term Memory (LSTM) Long Short-Term Memory is the knowledgeable adaptation of (RNN) design. It is utilized intended to demonstrate sequential arrangements and their long-range conditions more definitively than traditional RNNs. Generally speaking a reference to specific data put away a seriously quite a while in the past is expected to anticipate the ongoing result. Yet, "long haul conditions" can't be dealt with by RNNs. Here there could be no better command over what piece of the setting should be conveyed forward and the amount of the past should be 'neglected'. Accordingly here

the LSTM is utilized where the disappearing angle issue is totally taken out, while it is left unaltered to prepare model. Long delays in specific issues are addressed utilizing LSTMs where they additionally handle commotion, disseminated portrayals, and constant qualities. The essential contrast between the RNNs and LSTMs is in the design where the secret layer of LSTM is a gated cell. LSTMs consists of 3 logistic sigmoid gates and one tanh layer. These gates have been introduced to limit the information that is passed through the cell [2].

LSTMs likewise utilize input and neglect entryway rather than two separate doors that aided in pursuing both the choices at the same time. Profound LSTM will include various LSTM in the middle between the info and result. Profound LSTM with a Recurrent Projection Layer will have various LSTM layers where each layer has its own projection layer. For the situation where the memory size is too enormous expanded profundity is very useful. It has specific layers like -

Layer = lstmLayer(numHiddenUnits) makes a LSTM layer and Num stowed away property.

Layer = lstmLayer(numHiddenUnits, Name, Value)sets extra Output exercises, boundaries and introduction, name properties utilizing at least one name-esteem pair contentions. You can determine different name-esteem pair contentions, by encasing every property name in statements.

Here at first, the output of an LSTM at a particular point of time is dependent on three things –

1. The neglect door is the initial phase simultaneously. Here we will conclude what pieces of the cell state (long haul memory of the organization).
2. The new memory organization and the info door is engaged with this progression. The objective of this progression is to figure out what new data ought to be added to the organizations long haul memory.
3. One of the person might think that we can just output the updated cell state; but however; this would be comparable to someone else who is unloading everything they learned about the stock market when only asked if the, they think it will go up or down tomorrow. To prevent this from happening we create a filter, the output gate, exactly as we did in the forget gate network.

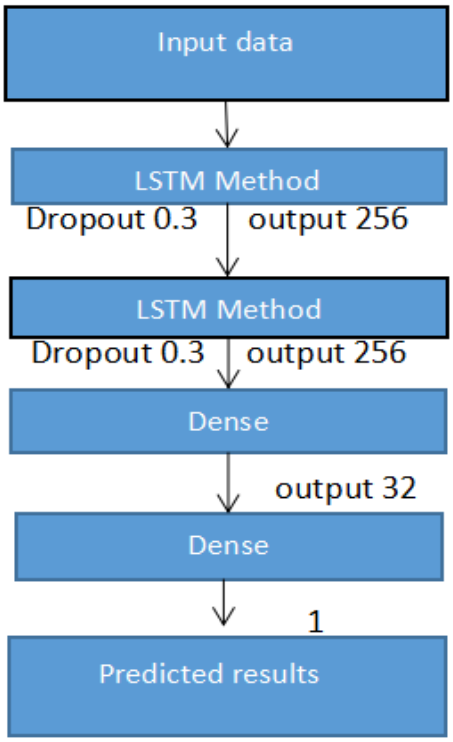

Figure 2: LSTM Layers

Figure 2 indicates that the interval of information is relatively smaller compared to LSTM. The main reason to use this model in stock market prediction is due to that the predictions depend on large amounts of data and are generally dependent on the history of the stock market. [1]

4. RESULTS

The above frameworks are prepared and tried over the dataset taken from Tesla for first strategy and google for second method. It is parted into to preparing set and testing set individually. The following results are yielded upon passing through the different models.

4.1 Regression Based Model Results

The accompanying diagram is acquired on applying the straight relapse calculation on the dataset of tesla from 29-06-2010 and 15-03-2019 to foresee shifting costs.

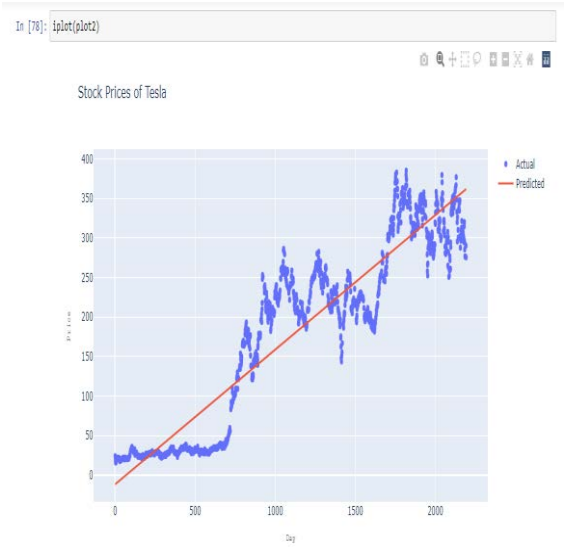

Figure 3: Stock Prices of Tesla

The actual stock prices are shown in blue and the predicted ones are shown by red line

4.2 LSTM Based Model Results

The following graph is obtained on applying the linear regression algorithm on the dataset of Google from 13-08-2018 and 13-08-2019 to predict varying prices.

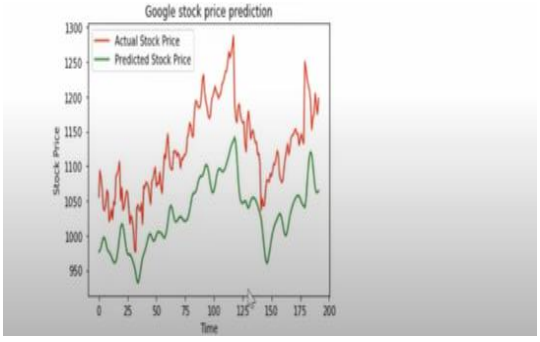

Figure 4: Google Stock Price Prediction

Red indicates actual stock price and green indicates predicted stock price.

5. IMPLEMENTATION

Following are some pictures of implementation with inputs of Tesla and Google companies and respective outputs

5.1 Regression Based Model

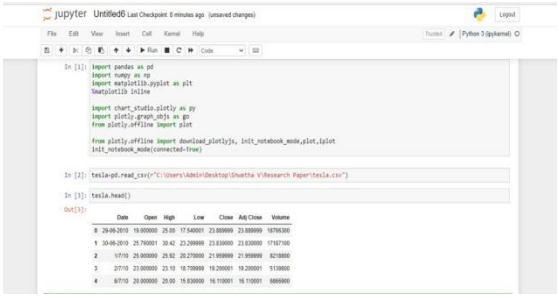

Figure 5: Top 5 rows from the dataset

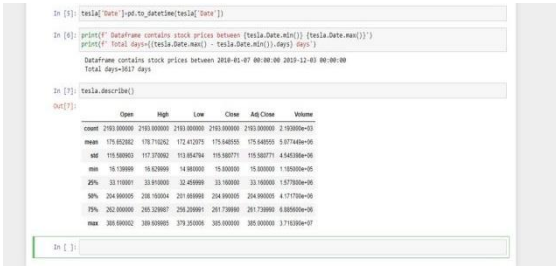

Figure 6: Some summary statistics for the data

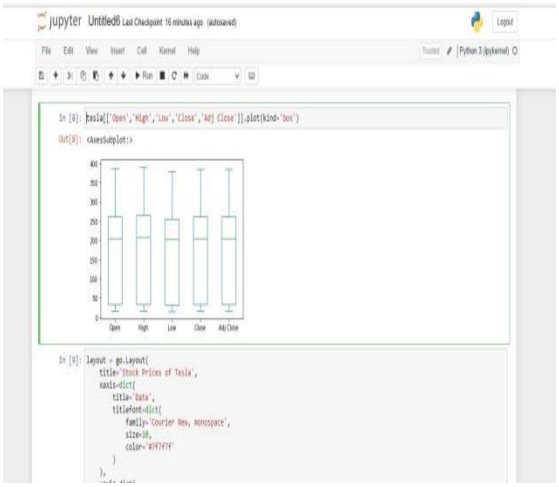

Figure 7: Boxplot

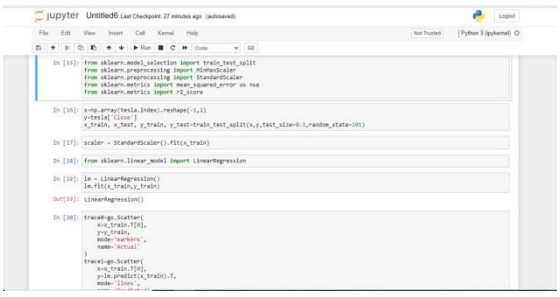

Figure8: This part gives the graph which contains actual and predicted stock values using iplot function.

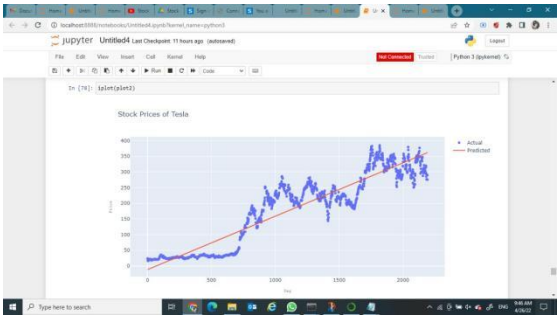

Figure 9: Actual and Predicted Stock Prices of Tesla

5.2 LSTM Based Model

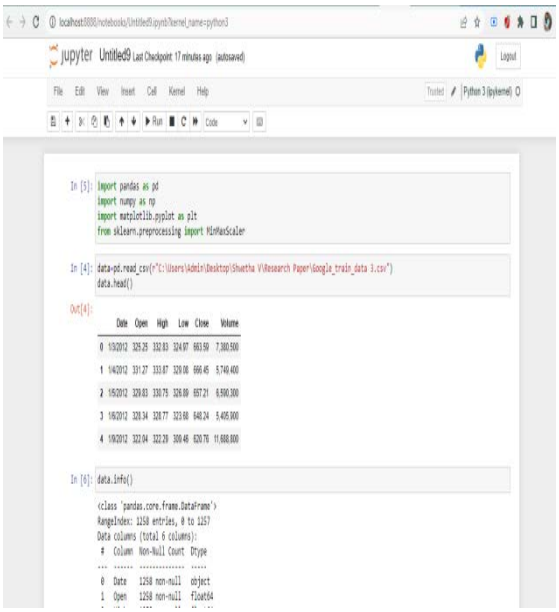

Figure 10: Top 5 rows from the dataset

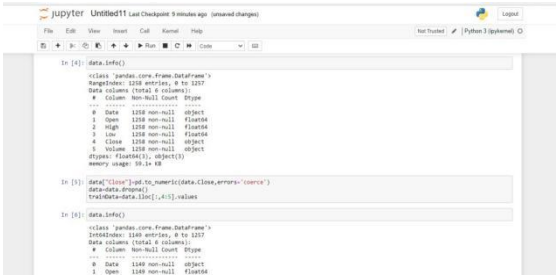

Figure 11: Total no of rows and columns in the dataset and the data types of each variable

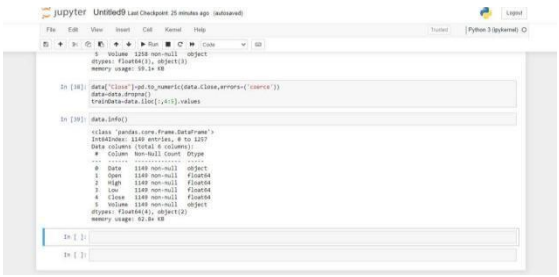

Figure 12: Change of datatype of closed column from object to float

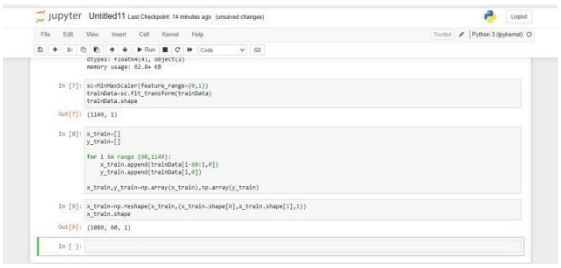

Figure 13: Reskilling the data between 0 and 1 for better performances

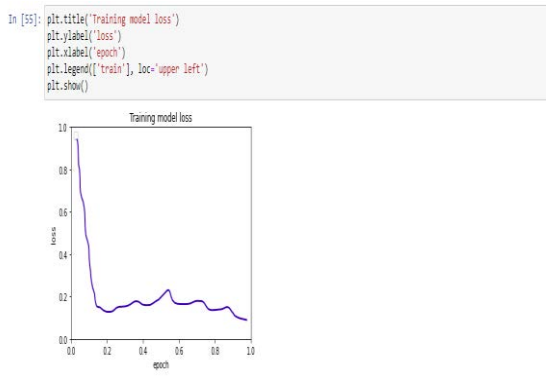

Figure 14: Visualization of loss that occurred during training process for each epoch

Figure 15: Testing of model with a new dataset

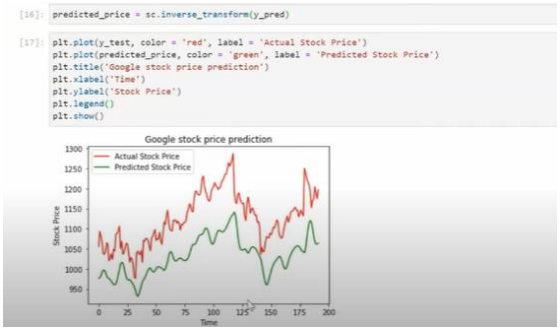

Figure 16: Actual and Predicted Stock values of Google. [14]

6. CONCLUSION

Investors commonly predict the stock prices to know the amount they get back. Generally, stock prices were predicted in traditional way by Brokers and Technical Analysts based on previous prices, volumes, price patterns and the basic trends. But, present it has become very difficult and complex task to predict stock markets because

now stock markets are dependent on many other factors like social and economic conditions of the country ,natural disasters and political atmosphere etc. Sometimes, the returns that investors get back is very uncertain and disastrous and is difficult to predict using traditional methods. So, a lot of research is made on finding the methods that can predict the accurate values of stocks .Some of them are machine learning techniques like LSTM AND Regression Based Model. These kind of methods help Stock Brokers and Finance Institutions in getting good return [6].

6.1 Future Work

In the future, a lot greater dataset can be utilized than the one being utilized presently accordingly expanding the financial exchange forecast framework. This prompts expansion in the exactness of our forecast models. Further, to foresee the upsides of stock costs different models of Machine Learning can likewise be studied [2].

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Detection of Fish and classifying their Species using Mask R-CNN

B Vinod Reddy[1], B Sreekanth[2], Naveen Chandra Gowda[3], B Jaswanth Reddy[4], Hari babu T[5]1,2,4,5

[1, 2, 4, 5] *UG student, School of computer science and engineering REVA University, Bengaluru, India*

[3] *Assistant professor, School of computer science and engineering REVA University, Bengaluru, India*

1 baddiputivinodkumarreddy123@gmail.com 2 sreekanthbandi10@gmail.com , 3 ncgowdru@gmail.com ,

4 bhemmajaswanthreddy130@gmail.com , 5 itisbabu1098@gmail.com

Abstract

The aim of the study was to develop a model for "fish identification and classification of species through the RCNN Mask." The exception to Faster R-CNN is Mask R-CNN. Object detection operations usually use the fast R-CNN. Provides links to binding boxes and class name in the picture for each item. The Mask R-CNN was easy for installing also provides R-CNN quick start up. There are two sides to the R-CNN mask. Based on the image from 1st paragraph, that givesan idea regarding locations that are possible.

From the concept of the main character in the second phase, the project phase is estimated by this, filters the binding box, also creates a mask at pixel level of object. From the basic shape ideas, it guesses category of the object, filters the binding box, and creates a mask exactly at pixel level of object. The algorithm proposes the classification of species and the identification of Albacore tuna, Bigeye tuna, Yellowfin, Moonfish, Dolphinfish, and Shark. Some of the principles in the index areAcquisition and Regional Proposal. Mask R- CNN, Resnet101, Network, Tie Box.

Keywords: Object detection, Bounding Box,Region Proposal Network, Mask R-CNN, Resenet101.

1. INTRODUCTION

The oceans have long attracted the curiosity ofhumans as an unusual natural system. People fishing for cucumbers in the sea, sea urchins, scallops, and other marine animals harm the coral reefs. We are developing software that can automatically detect and identify different types of images. In-depth learning has been one of the most important breakthroughs in practical over the past decade. Convolutional neural networks, an in-depth learning approach, are used in a variety of fields.

In general, a method based on the convolution network of neural image recognition is easy to develop. In-depth learning is an invention in the field of image processing that has gained much interest. In order to identify the types of animals in the images, a comprehensive learning-based systemknown as the Mask Regional convolutional network has been used. The RCNN Mask Frame was used to run our model. It is a multi-layered Faster Regional Convolution Neural Network includes a temporary fragmentation. This does so upon enlisting the use of a highly efficient such as Resnet, powered by FPN. It uses the most productive RPN (Regional Suggestion Network) by highlighting planning, which puts something already in the ROI (Region of Interest).

1.1 Problem statement

Due to fast technological advancement and humanincrease, fish populations in the oceans are quicklydeclining. As a result, underwater ecosystem conservation is critical. The most major problem facing fish conservation is the accumulation of resources and the organisation of massive volumesof data on marine life. In this scenario, a CNN model is utilised to extract different quantities of information from photos at different levels. Many

datasets of photographs taken by boat-cameras would have to be collected in order to implement such a system. And then running them through the programme to identify fish and classify species. A surveillance camera mounted on boats feeds photos into the system. Its job is to categorise the image into one of six categories: big eye tuna, dolphin fish, moonfish, shark, yellow fin tuna, and albacoretuna, and then inform the fishing team.

1.2 Our Contribution

This project's goal is to make it easier for people to recognise different types of fish. The model will be given photos from security cameras deployed on the boats to identify fish belonging to specific species. The initiative aids in the detection and classification of fishes belonging to species that arequickly becoming extinct in the seas. It will be ableto recognise species that have been trained using the Mask RCNN model.

1.3 Organization of paper

The whole paper is organized into different sections, where section 2 describes in detail the literature research, section 3 focuses on the Description of the Approach. Section 4 describesthe test. Section 5 discuss result.

2. LITERATURE SURVEY

1. B.S. in 2020. This study by Shravan Kumar Reddy and colleagues [2] uses a neural convoluted network to identify object and classification, and involves growth, acquisitionand classification divisions in the system. To address the problem of overuse, augmentation surgery was performed. A variety of data sets are used to produce standard pre-processing and growth that develops a professional model and binary classification. The fish were separated using VGG-16 section.

2. By 2020, Aditya Agarwal et al [3] Product aims for catch fish like an object. The model has many layers and stages of investigation, including growth, division, face mask and other methods. They used the F-RCNN framework, the modern version of the R-CNNframework, to build it.

3. In 2020, X. Yang et al [5] will present their findings. The Resnet101 network model was used as a feature release in this article, also the main pillar network is created by collaborating Resnet101 by pyramid network.

4. R. Mandal and colleagues [8] In this work, themask is taken to categories, also to locate area of interest (Roi). It furthers the previous framework by predicting the separation mask in the Reproductive Region (Roi) and providesthe best possible performance of in-depth learning models.

5. G. Gkioxari, K. He, and others [9] have described RPN (Regional Suggestion Network) and Fast RCNN strategies for MaskR-CNN in this study. Roi (areas of interest) collect the elements of the object and use the fast R-CNN to insert a binding box into the object, while the mask structures are created using fully integrated layers.

3. METHODOLOGY

The product was assembled using Python. The model was trained for identifying fish using a dataset. Each fish bounding box is determined by RCNN and when it is pushed beyond the limit, certain fish characteristics are easily noticed. Is it afish? Then algorithm starts dividing what type of fish it is, and result would reveal which type of fishit is. Furthermore, as a result.

a. DATA COLLECTIONS

The images are loaded out of dataset and then transformed six times. This dataset is utilized in the training process. The collection originally contained 1043 pictures, however, thereafter escalation, 7301 pictures. Data escalation the amount of data collected, permitting for greater guidance and reducing neural network summarization.

b. DATA PRE-PROCESSING

The data is pre-processed before being entered intothe suggested model. The first step is to resize the original image to the appropriate pixel size. The data is then produced at random. Usually, this is done to improve the stability of the model. Dataset used to alter and produce training on photographs with varying contrast levels easier for the model.

c. PROPOSED SYSTEM

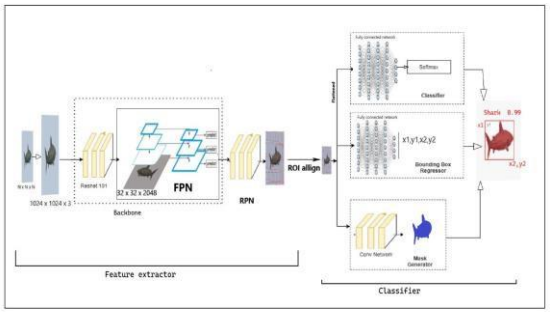
A well-planned strategy and ordered layout for every module are included here. This section also delves into the specifics of the various modules while considering the characteristics, such as information and yield. In this piece, the components that make up the attempt are thoroughly discussed. This section places a strong emphasis on the undertaking's back-end operations. The goal of this section is to clarify the assumptions and standards that underpin each.

d. MODEL TESTING AND TRAINING

The goal here is that to train the CNN design to anticipate which fish type will be caught. For the training and testing of the model, the acquired dataset is randomly bifurcated. The photos are used for 69 percent of training and 31 percent of validation. The trained data is delivered straight towards CNN model, which is then fine-tuned for the task at hand. The tuning model is next tested for correctness using the testing data. As classifiers, the preparing phase is separated within two parts: fully connected layers and convolutional networks. Every element of these structures has a distinct function. Convolutional layers are used to pull out attributes from a photograph.

3.1 *System Architecture*

The R-CNN mask is a comprehensive framework for visualizing the object on the image while providing for every event a separation mask. A two-step encryption method is used by R-CNN. Marking is the first step. The second step is to sort the items, binding boxes and masks into categories. The network receives an image of NxNxN parameters. Originally 1024 x 1024 x 3. This means that the width and height of the image is 1024 pixels and three channels (RGB). CNN is photographing this extended image (Resnet in this case). This method removes image elements. The feature pyramid network is used to advance retrieval features (FPN). A map of the collected area is sent to the Regional Proposal Network (RPN), which determines which regions may have the properties. Because the output of this module does not have a fixed size, we use Roi direction to change its size. The second part of the model startshere. After Roi, a 2d matrix is flattened and consumed in a fully connected network, still distributing opportunities for each class. Any number can be used for this possible distribution. The SoftMax function is used to get these integers into the range of 0 to 1. The object belongs to the class with the greatest score. Another fully connected network receives the identical flattened 2d array, which returns the bounding box coordinates. These are the bounding box's genuine coordinates, so no SoftMax function. Another CNN predicts the mask for the object based on region suggestions. Which is then scaled up to a bounding box and placed in the object's centre.



Mask RCNN Model

Figure 3.1

The task's many segments have unique limitations and professions. To make a module operate, it must be tweaked to meet a certain goal. As a result, the focus points of the various modules are depicted in this section.

3.2 ***Sequence Diagram***

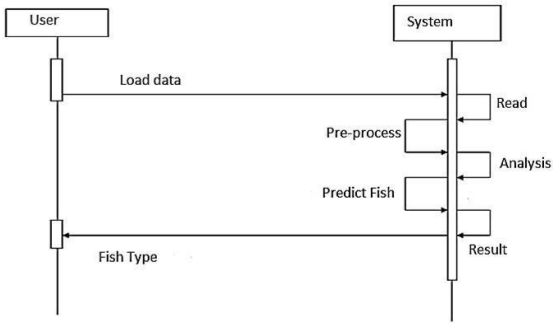


Figure 3.2

Figure 3.2: The sequence diagram is a UML diagram's interaction diagram. The graphic depictsthe interactions between the system's numerous objects. The sequence diagram depicts how the things cross paths in the order in which they have an impact. The sequence diagram depicts interaction in sequential order. The arrangement- like box denotes that the thing is connected to the internet and may communicate with other objects. The straight line shows that the item is no longer online and communicating. The arrow's label indicates the direction of interaction. The object user connects to the system, sends a load data message, and then disconnects. The system becomes online and receives the data at this moment. It pre-processes the information, analyses it, and predicts the species/fish type.

4. TESTING

HARDWARE REQUIREMENTS:

Processor: Intel core i5 or equivalent, Hard Disk: 100GB, Monitor: Standard Display, Ram: 8GB, Input devices: Keyboard, Mouse, GPU: 2GB.

SOFTWARE REQUIREMENTS: Operating system: Windows 10 or ubuntu, Programming Language: python, CUDIA toolkit, Python Package: TensorFlow, H5py, Keras, OpenCV.

5. RESULT

The model was tested on a few photographs that were chosen at random. The results of the test arelisted below.

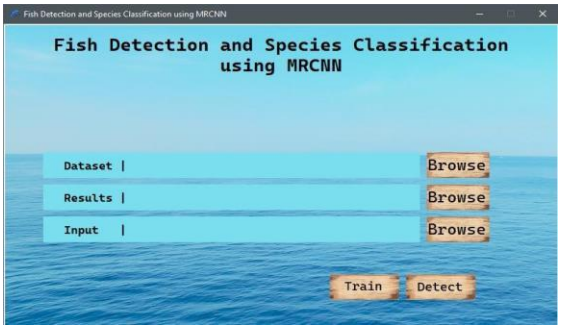


Figure 5.1

Figure 5.1: The connection provided by the user interface with the system are shown and highlighted in the image above.

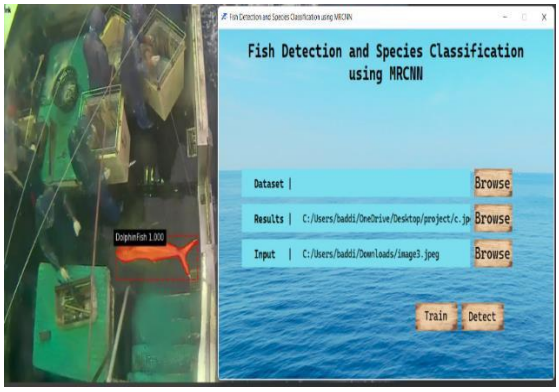


Figure 5.2

Figure 5.2: The user will select an input image using the same browsing button. The final image storage method must also be selected.

Figure 5.3

Figure 5.3: After clicking the view button, the viewer will open it to display the resulting imagecontaining the fish found in the square box.

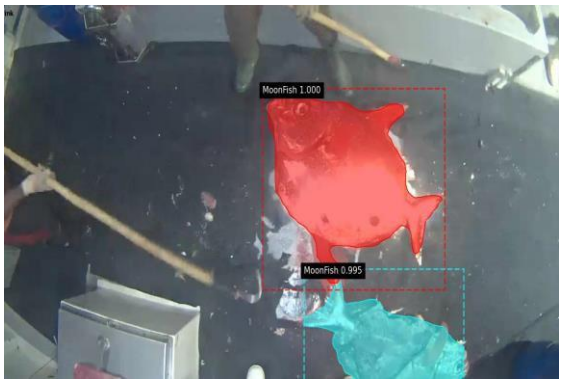


Figure 5.4 Moonfish

Figure 5.5 Dolphinfish

Fish species	precisions	Recall	F1_score	support
Albacore tuna	0.83	1.00	0.91	30
Bigeye tuna	0.96	0.77	0.85	30
Dolphinfish	1.00	1.00	1.00	30
moonfish	1.00	1.00	1.00	30
Shark	0.97	1.00	0.98	30
Yellow fin Tuna	1.00	0.97	0.98	30

- Number of photos in Table 1 serves as support. There are 30 photographs in each class, for a totalof 180 images.

6. CONCLUSION

Overfishing has resulted in the extinction of a few species of fish. Fishing for such species is the onlyway to earn money for several fisherman. In order to maintain the balance of the environment, great efforts must be made, including the possibility of

illegal fishing on the verge of extinction. It is difficult to track down illegal fishing. We can use surveillance cameras on fishing boats, collect photos from time to time, and upload them to a model based on current findings. The aim of the model shows for identifying which type of fish caught, also to warn experts if it has been caught illegally. The model works best when trained on alarge, diverse database.

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A Pearson Correlation Based Approach for Assisting Recruitment Process

AmeghR

Department of CSE
Reva University, Bangalore, India
amegh.r@gmail.com

Abhik Shil

Department of CSE
Reva University, Bangalore,
Indiaabhikshil@gmail.com

Abhishek Kumar

Department of CSE
Reva University, Bangalore,
Indiaabhikr.9399@gmail.com

Ankur Ashuthosh Jha

Department of CSE
Reva University, Bangalore,
Indiaankurjha72@gmail.com

Prof. Supreeth S

Department of CSE
Reva University, Bangalore,
Indiasupreeth.s@reva.edu.in

Abstract:Currently, placement-related updates are being provided mainly through WhatsApp and Email, which causes ambiguity and miscommunication. This paper studies the Indian placement scenario of today and highlights the necessary changes to be brought about to ensure a smooth concise placement process. It looks at how potential recruiters interact with students and universities to hire desired candidates for various roles. It is based on a placement application built by the team for campus recruitment. A machine learning approach is used which predicts the required study material for the students with the help of Pearson Correlation method which considers the test score of a student as a deciding factor and compares it with the score assigned to the placement material for suggesting the resources in order to improve the knowledge related to a topic. This approach helps a

student in understanding their weakness and suggest the required solution for overcoming those by making use of the machine learning prediction model

Keywords: Placement Assistance, Pearson Correlation Approach, Placement Study material, Coding platform

I. INTRODUCTION

` Campus Placement is an absolutely complicated process. Right from the start of inviting companies for placements to making the students placement ready and getting them placed in a reputed organization. The entire process requires dealing with a lot of data and hence the systematic storage and availability of data are quite essential.This paper is aimed at developing an application for the Placement Department of a College. The system can be accessed throughout the organization with authentication. Once any company approaches for placements, the admin will upload details about the company which includes the eligibility criteria, package, number of openings, contact details, and other suitable details required to be shared with the students. The admin can filter students based on the eligibility criteria and share the info as well.The students have to option to evaluate themselves by taking up aptitude test and based on the score they receive the machine learning model implemented will predict the study materials required for the student using Pearson Correlation that will calculate the topic wise score and suggest resources related to that particular topic. Taking inputs [13], the personalized recommender system was created for making the required placement material prediction.The companies then can utilize the testing and coding platform to conduct their rounds using Cloud Computing [14]. Students will be updated regularly on the placement process and selection. Also features like filtering eligible students, chat-bots, and other statistical information will be available for making the user experience and decision-making better. The main motivation behind choosing this project idea came from the current scenario of undergoing campus placements, certain voids can be filled with our application.Workflow Diagram of Placement Assistance Application is shown in the Fig. 1.

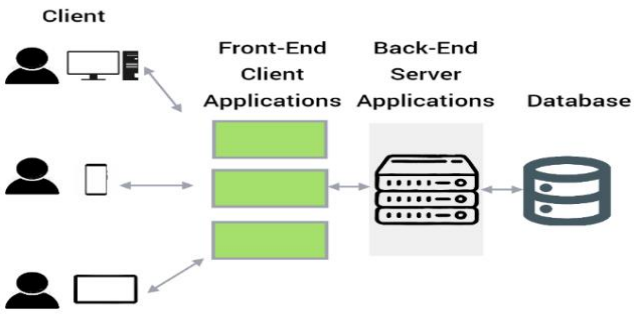

Fig 1. Workflow Diagram of Placement Assistance Application

Following are the objectives which are been addressed in this work.

1. Create a placement assistance application that helps in overcoming the problems faced in the traditional manual practice of conducting offline recruitment drives.
2. Implement a machine learning prediction model using Pearson Correlation method
3. Include features like resume builder, coding platform, chat-bot, study materials for student support
4. Collect data from the company to provide a job description for students as well as for the placement materials and to train chat-bot
5. Ensure the application is user friendly and is easily accessible for the students and the placement department team of a particular institution

II. Literature Survey

In [1] mainly address about the various advantages and benefits of online job portals. The mainidea behindof creating such a platform is to support thestudentsin finding the profession theywant. The existing web applications and not very efficient. To overcome the difficulties and make a platform which is efficient and provide accurate results, huge data was gathered, and a new website was created. This website will be useful for a student on that campus who is preparing to get placed in a reputed company as it gives job notifications based on the ability and skill of a candidateand the employers can filter the students based on the requirements of their company. So, this can help a student to exploremanyjobs and the recruiters can find suitable employees easily

In [2]addresses about the various issues that are faced by every employer because of the huge number of job applications it receives. The proposed model aids the HR department in collecting the required information about a candidate and shortlisting them as well as rearranging them based on the skills which are mentioned by the applicant in their CV or resume. The model also conducts an interview with the help of a chatbot in order to find out fake CVs and also to understand the personal skills and behaviour of the candidate by capturing facial expressions through the camera. The candidates that are interested to work in a company can check the job requirements and then apply for that post. Therefore, the virtual process will reduce the hectic workload of the recruitment team and helps them in saving a lot of time.

The literature review which is described in [3] is mainly intended for students whoare in the second last year perusing various courses to get placed in a company they dreamt of. It discusses regarding various predictions that will be helpful for students to realize the existing knowledge they have and the steps they need to take which can improve their skills. A device called placement suggester will examine the chances of a student getting selected for a company and many programs created which will be useful for an academic institution for providing training to improve the skills and knowledge of a candidate. By making use of various algorithms and by exploring data, a variety of predictive models can

be created which will help a candidate to travel on the right path in getting a satisfactory job.

In [4] demonstrates how a job prediction model can be created for students and also how data mining will be useful in structuring the educational system to get the best results for placements. The model will collect information from the students and based on that the students can be classified according to the type of companies in which the student is likely to get selected in like companies that recruit heavily, which pay more than average,and which pay high salary which is dream job. The described model will also suggest the various new skills and technologies in which a student should gain knowledge so that their chances of getting selected will be high. The various results, performance measures, as well as the real-time findings of the model,are mentioned in the paper which plays a major role in improving the strategies that an educational institution must follow to train a student to become a good candidate for the placement activities and also in real life.

In [5] describes the new strategy which is being followed for conducting recruitment of students from an institution. The various problems and disadvantages of the traditional method of conducting the drives where the recruiters visit the campus for shortlisting the students to find the best candidate who is suitable for the job are mentioned. This paper comes us with an ideal solution by making the placement drives online where the students can attend the various rounds of selection through their laptop or desktop from anywhere and get selected for the job. Recruiting a candidate by making use of the internet is given the term green placement. This makes it easy for the students to participate in the recruitment process and also for the selectors and placement department of a particular institution for conducting the shortlisting process easily and smoothly. This method helps in saving many resources like time, space for conducting drives water, electricity, cost, etc.

In [6], discusses about creating a job proficiency profile of a candidate which can be helpful in understanding various details about the candidate to help them in improving their knowledge and skillset. The eligibility of a candidate for applying to a specific job can be found with the help of a competence profile so that it becomes easier for the recruiters as they will be receiving applications only from the eligible students. The feedback received after taking various tests and skill up-gradationprograms will help the candidate understand where they stand and the necessary steps that need to be taken to improve themselves. In this way, a candidate can prepare with a proper strategy for building their skills and will be useful in getting placed in a reputed company.

In [7] described two mathematical models which recommend a suitable candidate for hire. It becomes a gruellingtask when the number of candidates who applies for a job is huge. Doing the work manually can consume a lot of time and effort and the chances of creating an error are also high. For understanding a candidate better, comparing a profile method can be used and shortlist them for further rounds and Naïve Bayes can be used to predict if a student has the chance of

getting placed or not. Bivariate correlation is used as an assessment factor for Profile Matching. The accuracy and also correlation data are provided in the paper which depicts the placement of a candidate with 100% efficiency by making use of Naïve Bayes method.

In [8] addressed the onlinehiring process canbe mainly based on the information that are provided on theresume. For finishing the process of selecting of a candidate for a particular job, most of the tasks should be automated. One of the main automation tasks in the selection process is to compare the different wordsthat are given in the candidate's profile with the ones that are mentioned in the job description.This method sometimes gives low exactness, and many suggestions are not dependable. Based on the meaningslatest approaches have been created but it has limitations because of the partial resources and lack of proper domain coverage.The system was deployed victoriously, and attestation is provided in the paper which shows that it becomes very much useful in the hiring process.

III. Methodology

The Placement Assistance Application is helping in overcoming such difficulties and making the process of placements much smoother which also helps in saving many resources like cost, time, paper, electricity, etc.

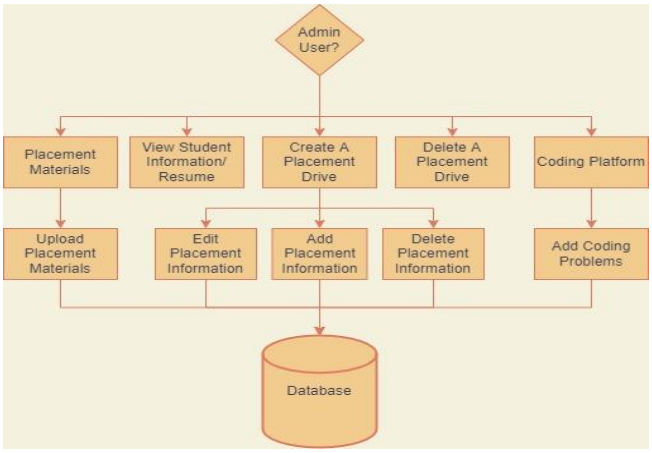

Fig 2. Block Diagram of Admin Functionalities

Fig 2. Depicted the block diagram of the Placement Assistance Application. The Placement Assistance Application consists of one Admin Module and a Student/User Module.

3.1 Admin Functionalities

Taking reference from Fig 2 we can see all the mapped activities of the admin. The admin can register themselves on the website by providing simple details which will include their name, email address, university, and password that are supposed to check

the admin box if registering as an admin. On successful submission of the details. The university authorities will verify the identity of the admin. On successful verification of admin, the details of admin are stored in the database. Here the password stored will be hashed using the sha256 hashing technique. Fig 3 shows the Block Diagram of the System

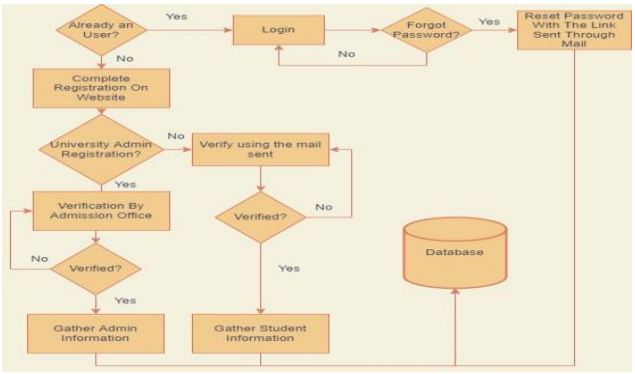

Fig 3. Block Diagram of Registration/Login System

The admin then can have the functionalities to add a placement. Here he/she is supposed to provide details which will include the company name. Once the company tab is created the admin can go into that tab and make further updates. There the admin can add/edit an update from the company or placement department by clicking add notes.The admin will also have a list of candidates with their resume details which the admin can view and provoke necessary actions and share them with the companies recruiting.

3.2 Student/User Functionalities

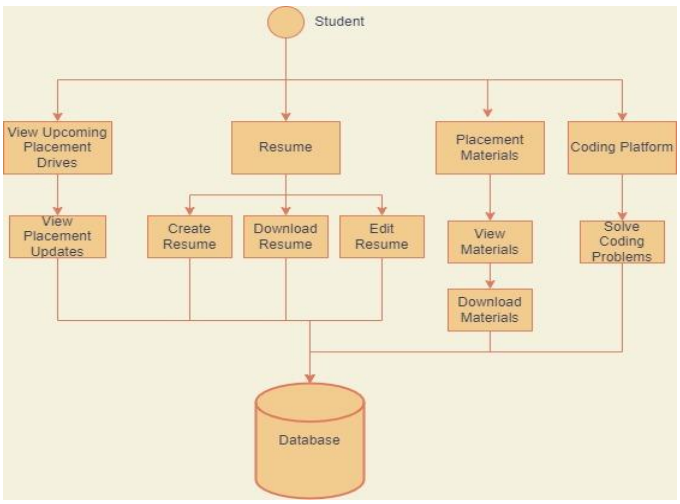

Fig 5. Block Diagram of Student Functionalities

Fig 5. Here depict the functionalities that a user can perform onthis website. The student can register themselves in the similar way it is mentioned in case of admin. The user will

receive a mail to verify themselves once done, they can revert to the application and login themselves.

The users here will have the functionalities of viewing all the upcoming placement drives. Once the user clicks on any recruiting company tab. He/she will be able to see all the updates regarding that hiring process and further updates from the company.Also, the users will be able to create their own resume by going to the resume section and clicking on create your resume. Here the user will be required to provide certain details like their 10^{th} class percentage, 12^{th} class percentage, skills, hobbies, etc. Once the user submits these details, they will be able to view their resume. By clicking on the download resume button, the user can download their resume in pdf format. And they can also edit their resume if required by the edit resume button.

3.3 Placement Materials

The users can head over to the placement materials tab, they can access all the placement materials required. They can filter them using the search tab.And they can head over to practice questions to test their skills. The admin can upload and update the necessary materials when required for the students to access and download from the application.

One of the differentiating factors in our application is the placement material recommendations. Users will be first prompted to give a test, based on the score they receive in this particular test, the users get recommended with study materials that they might want to refer.

For performing this particular task, we have used a machine learning algorithm using Pearson Correlation technique.Pearson Correlation Coefficient algorithm is widely used algorithm for various similarity measures as mentioned in [10]. Hence a suitable similarity measure key is needed to be chosen for the system to make proper recommendations.

Considering two users U and P respectively the Pearson Correlation Coefficients can be given as mentioned in [11]

$$w_{a,u}=\frac{\sum_{i=1}^{n}(r_{a,i}-\overrightarrow{r_a}).(r_{u,i}-\overrightarrow{r_u})}{\sqrt{\sum_{i=1}^{n}(r_{a,i}-\overrightarrow{r_a})}.\sqrt{\sum_{i=1}^{n}(r_{u,i}-\overrightarrow{r_u})^2}} \quad (1)$$

$$p_{a,i}=\frac{\sum_{u=1}^{m}(r_{u,i}-\overrightarrow{r_u}).w_{a,u}}{\sqrt{\sum_{i=1}^{n}(r_{a,i}-\overrightarrow{r_a})}.\sqrt{\sum_{i=1}^{n}(r_{u,i}-\overrightarrow{r_u})^2}} \quad (2)$$

Where**'a'** represents active user, **'u'** represents another user in the system, **'n'** represents the number of items both users recommended, '**ra**' represents the rating of active user and '**ru**' represents the rating of another user.

The correlation of two independent variables as given in [12] can be derived if we have two zero-meaned random variables. Let us consider x and y as two zero-meaned variables then the Pearson Correlation Coefficient can be given as [12]

$$\rho(x,y)=\frac{E(x,y)}{\sigma_x.\sigma_y} \quad (3)$$

Where **E(x,y)** represents the cross-correlation between x and y and $\sigma_x$and σ_y represents the variances of x and y respectively.

Algorithm 1: Placement Material Recommendation Using Pearson Correlation in Python

Input: User Test Score csv and Placement Materials csv

Result: Recommended placement materials for users to refer.

1. START
2. Fetch the user test score and placement materials csv files from the database.
3. import pandas and NumPy as pd and np respectively.
4. Set user_test_score using pd. read_csv(user_test_data.csv)
5. Set user_test_score_columns = ['user_id','aptitude_score','programming_score']
6. Set user_aptitude_score to user_test_score['aptitude_score'] and user_programming_score to user_test_score['programming_score']
7. Set placement_material_data using using pd. read_csv(placement_material.csv)
8. Set placement_material_data.columns = ['material_id','material_title','material_type','material_author','score']
9. Set aptitude_materials to all placement_materials which have material_type=="aptitude"
10. Set programming_materials to all placement_materials which have material_type=="programming"
11. Form a DataFrameaptitude_material_score_count using pd.DataFrame(aptitude_materials.groupby('material_id')['score']. count()) and sort it using sort_values().
12. Also Form a DataFrameprogramming_material_score_count using pd.DataFrame(programming_materials.groupby('material_id')['score'].count()) and sort it using sort_values().
13. Now using correlation between user_aptitude_score and aptitude_material_score_count using aptitude_material_score.corrwith(user_aptitude_score) and store it in corr_aptitude_material.
14. Also using correlation between user_programming_score and programming_material_score_count using programming_material_score.corrwith(user_programming_score) and store it in corr_programming_material.
15. Form DataFramesrecommended_aptitude_material and recommended_programming_material using pd.DataFrame(corr_aptitude_materials,columns=['pearsonRating']) and pd.DataFrame(corr_programming_materials,columns=['pearsonRating']).
16. Finally merge the recommended_aptitude_material with placement_material_data on column 'material_id'.
17. Also merge the recommended_programming_material with placement_material_data on column 'material_id'.
18. Now the both the datasets are ready to be recommended to the users.
19. STOP

3.4 The Coding Platform

The users can practice their coding skills in various programming languages.

Propercompany-specific coding problems with test cases will be provided to the users to practice their coding skills and get placement ready.

Various compiler for compiling languages like C, C++, python and Java need to be incorporated properly in order forimplementing the test cases accurately as mentioned in [14].

3.5 Remember Me feature (Cookie creation)

Algorithm 2 shows the cookie creation for implementing the remember me feature, so that the user will still be remembered even after the browser is closed.

Algorithm 2: Remember Me Cookie Creation

Input: Two Randomly Generated Strings Result: Cookie for remembering the user when they visit next time.
1. START 2.Check if user has checked the "Remember Me" box. 3.If yes, then create two variables authentificator1 and authentificator2 4. Assign authentificator1 to a randomly generated string of bytes using opensl_random_pseudo_bytes(10) function. 5.Convert authentificator1to hexadecimal using bin2hex(authentificator1) function. 6. Assign authentificator2 to a randomly generated string of bytes using openssl_random_pseudo_bytes(20) function. 7. Concatenate authentificator1 and authentificator2 and store it in a variable cookieValue. 8. Now set the cookie by passing the cookieValue variable in setCokkie(cookie_name,cookieValue,expirytime) function. 9. Now hash the authentificator2 variable using hash('sha256', authentificator2) function and store it in f2authentificator2 variable. 10. Finally run the SQL query to insert authentificator1, f2authentificator2, user_id and expiry_time to rememberme table. 11. STOP

3.8Database Connection and Population

The database is connected by providing certain details which include the database name, database password, database username. Once the connection is established, various MySQL operations are performed on need. Various select operations to fetch existing user and placements data. Also, various insert and update commands while managing

placement and user details.The Fig 6 below gives the complete flowchart on how our website works.

IV. Results and Discussion

The application is able to overcome few of the existing problems. Previously most of the colleges stores the student's details in excel sheets, for a student to prepare for placement activities they have to go to different websites for getting information and every time they need the internet for accessing it. The placement coordinators provide the details about the placement drives through WhatsApp or email. The students will be having so many queries in their mind for which they have to individually call the placement coordinators.

The proposed application is able to solve these difficulties. All the student's biodata will be stored in a database and can be viewed in the website in a user-friendly manner. The students can access the placement materials in one place and can download those and study them offline. The mentioned algorithms are able to predict the study material for the students and filter them based on the test scores which they can take for the web application. The chatbot is able solve all the doubts that the student is having and the students can practice coding with the help of the coding platform

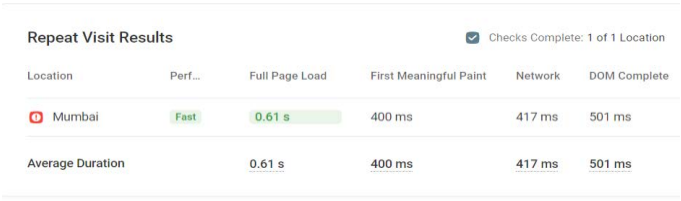

Fig 7. Throughput Analysis

Fig 6. depicts the website has a throughput of 0.81 seconds on first time load, and 0.61 seconds or repeat visit.

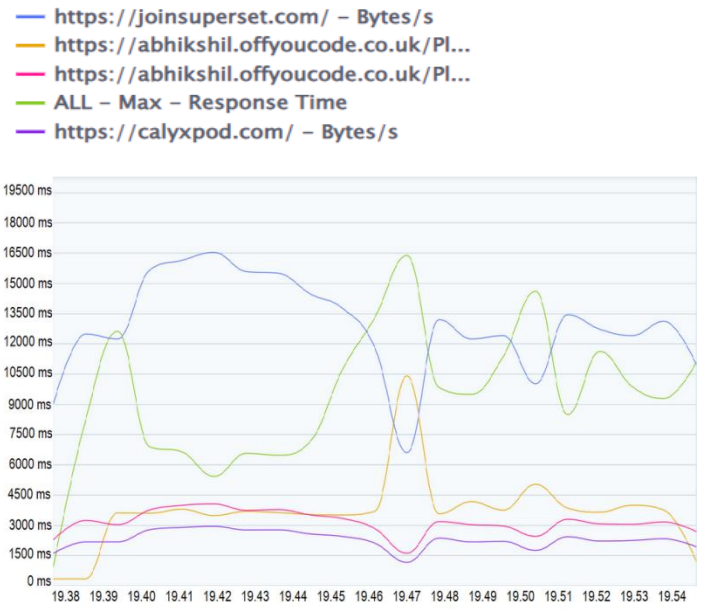

Fig 7. Throughput And Byte Analysis of Our application with clayxpod and superset

Comparison Table: -

Features	Placement Assistance Application	Superset	Calyxpod
Placement Support	Yes	Yes	Yes
University/College Management	Yes	Yes	Yes
Student Management	Yes	Yes	Yes
Resume Builder	Yes	Yes	Yes
Customized Placement Materials	Yes	No	No
Practice Coding Platform	Yes	No	No

Table 1: Feature Comparison Analyses

Fig 8. Placement Updates

V. Conclusion

The work was focused towards creating a web application that will be beneficiary to students, recruiters, and the coordinators of the placement department of a college in conducting the placement activity smoothly by organizing the student data and the details related to a job provided by the company in a well-structured manner. The application stores the details regarding login/signup, student's biodata, and job description in the database. The study materials support a student for preparation, the chatbot for user's help, and a coding platform for practicing programming questions. The algorithms used in the application will make predictions for the students regarding the study materials they need to refer based on their test scores. The recommendation system using Pearson correlation approach is able to provide the list of recommended placement materials in an efficient interval of time. The entire application is hence able to solve all the placement needs as it is a one stop solution and is providing a throughput of 0.61 seconds which is 32% faster as compared to the existing solutions for placement assistance.

VI. Acknowledgement

We would like to thank Reva University and our guide for providing us with the opportunity to research on the current placement scenario in India and build a dedicated assistance application to solve basic issues at campus level.

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OBJECT RECOGNITION AND FACE RECOGNITION FOR VISUALLY IMPAIRED PEOPLE

Manoj Sharma V
UG Scholar
Computer Science & Engineering
REVA University
Bangalore,India
R18CS218@cit.reva.edu.in
Krishnapuram Kalyan Kumar Reddy
UG Scholar
Computer Science & Engineering
REVA University
Bangalore,India
R18CS191@cit.reva.edu.in
Manthan N R
UG Scholar
Computer Science & Engineering
REVA University
Bangalore,India
R18CS219@cit.reva.edu.in
Bindushree D C
Assistant Professor
Computer Science & Engineering
REVA University
Bangalore,India
Bindushree.DC@reva.edu.in

Lalith Kumar Nitesh Kumar Mehtha

UG Scholar

Computer Science & Engineering

REVA University

Bangalore,India

R18CS200@cit.reva.edu.in

Abstract

The technology shown here is designed for visually impaired people to recognize objects and faces in their environment, allowing users to walk around securely without colliding with them. Object identification is related to the video captured by the camera. OpenCV, YOLO, and FaceNet are used to recognize faces and things in the video recorded. When a human face is spotted, the algorithm matches the name to the individual. The user will next be given with an audio version of their identity. Likewise, items spotted in the area will be delivered to the user in audio format along with their names.

Keywords— Visually Impaired, YOLO, OpenCV, Object identification and Face recognition..

I. INTRODUCTION

Many people are disabled, both temporarily and permanently.

There are a lot of blind people all throughout the world. According to the World Health Organization (WHO), about 390 lakh people are fully blind, while another 2850 lakh are purblind, or visually impaired [5]. Many supporting or guiding systems have been produced or are being developed to help people navigate from one place to another in their daily lives.

Common tasks required medium sight, interaction, reading and writing of certain sight, analyzing the surrounding space, and activities involving distant sight are all affected by poor eyesight. Furthermore, any task needs constant eye concentration.

Emerging developments in computer vision technology have prompted researchers to focus their efforts on providing solutions for persons with visual impairments. These devices are designed to assist the user in moving about securely.

The prospect of deploying technologies to detect objects [7] and individuals in the immediate surroundings was investigated in this study. The detection result is delivered to the user in digital audio. The capabilities of vision and hearing are similar in many respects. A real-time object detection and facial recognition system is detailed with the goal of making a user aware of the objects and people in his immediate surroundings.

II. LITERATURE SURVEY

The most challenging situations with respect to the blind or visually impaired population is to fight with unemployment [1]. Many schools adapt the existing Braille to educate them but it becomes unachievable due to the high demanding expenses.

Out of 12 million visually impaired people, only 10% of them makes an effort to learn Braille. Using computer vision to read any text in any format and lighting condition a non-expensive wearable device was designed using Raspberry Pi along with a camera to record content around and translate the same to the blind in their choice of language and a sensor to alert the user about the distance with an object. The system is designed including of image processing, machine learning and speech synthesis techniques. The accuracy recorded with both optical character recognition and the object recognition algorithms was found to be 84% [1].

Smart spec [2] produces a voice output for the visually impaired persons using text detection. Specs comprises of an inbuilt camera to capture images and is further analyzed using Tesseract-Optical Character recognition (OCR). Text is converted to speech with open-source software speech synthesizer, eSpeak. Further the headphones produce the speech by TTS. Raspberry Pi acts as an interface between camera, sensors, IP, and controls the peripheral units.

In the field of electronic travel aids (ETA) which comes with sensor technology and signal processing, it greatly improves the mobility of visually impaired persons in dynamic conditions. Results are achieved in the field of like integrated environment for assisted movement, acoustical virtual reality (AVR), bioinspired solutions [3].

In this paper, many computers vision technology has been developed to assist blind or visually impaired people. Wayfinding, navigation, and finding daily necessities have all been made easier with the help of camera-based systems [9]. The observer's movement causes all scene objects, whether stationary or non-stationary, to move. As a result, detecting moving objects with a moving observer is critical [9].

It is described how a CNN-based correlation algorithm can help visually impaired persons. Given the wealth of information that can be derived from pictures captured, adding a visual processing unit in the framework of systems that aid persons with visual impairments is urgently important, regardless of the version presented. This research describes a correlation technique that uses cellular neural networks (CNNs) to improve the characteristics of helping systems and provide more information from the surroundings to visually impaired people [4]. Parallel processing can handle the majority of the operations (calculations) in the suggested approach. As a result, the computing time may be reduced, and the computing time does not rise proportionately with the size of the template pictures [4].

III. PROBLEM DEFINITION

Visually Impaired are unable to move because they are unable to recognize the terrain and surroundings [6]. In your daily life, you will repeatedly require assistance and walking support systems. Without vision, it can be difficult for the visually handicapped to navigate a room or hallway without running into objects. Even with assistance, such as a walking stick, avoiding obstacles can be difficult, uncomfortable, and possibly inaccurate.

IV. METHODOLOGY

Identifying several object in a picture is called object detection, and it includes both object localization and object categorization. A first basic method would be to slide a window with variable dimensions and use a network trained on cropped photos to predict the content class each time. Convolutions can be used to automate this procedure, which has a significant computational cost.

The main principle behind YOLO is to place a grid on an image (typically 19x19) in which just one cell, the one holding the center/midpoint of an object, is responsible for identifying that object.

The image recorded will be broken into little grids in this method. The midpoint will be determined using these grids. The midpoint of the bounding box will be bx and by, as well as the width and height will be bw and bh. The confidents will be determined from this, and if the probability of mid-point is equal to or greater than confidents, the object or person name to which the confidents level matched will be predicted.

Intersection Over Union method to assess item localization, which quantifies the overlap between two bounding boxes. Many outputs may be generated when estimating the bounding box of a given object in a particular cell of the grid; Non-Max Suppression helps

you identify the object just once. It chooses the box with the highest probability and ignores the other boxes with a lot of overlap (IOU).

Block Diagram

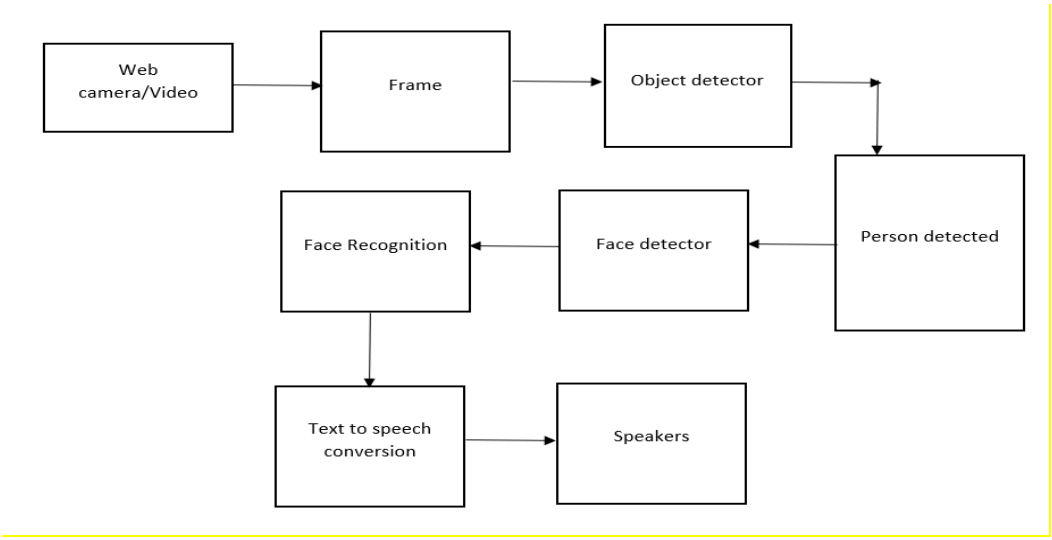

Fig 1: Illustration of the developed framework

The camera will capture live video, and the frames will be drawn from the footage. The objects as well as the person's face will be identified. The object's name and confidentiality will be determined. The audio output is created after the text to speech conversion.

I. SYSTEM IMPLEMENTATION

Python libraries include Scikit-learn for machine learning, OpenCV for computer vision, TensorFlow for neural networks, and more. Real-time computer vision tasks are performed with OpenCV. YOLO provides a framework for object detection in near-real time. Keras is a TensorFlow and other frameworks-compatible deep neural network library.

It's user-friendly, and it makes neural network-based machine learning models extremely straightforward to train. Keras is a useful toolbox for a number of applications since it contains a variety of neural network add-on features including as layers, optimizers, and activation functions.

Some hardware made use of a camera for live video capture and a headphone for audio output.

II. EXECUTION AND RESULTS

The following image shows the final detection results.

Fig 2: Face Recognition

Figure 2 shows an example output of facial recognition on the system, complete with bounding box, name of person detected, and confidence score.

Fig 3: Object Recognition of Bottle

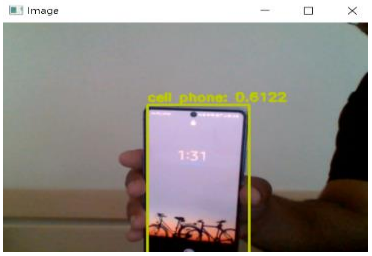

Fig 4: Object Recognition of Cell Phone

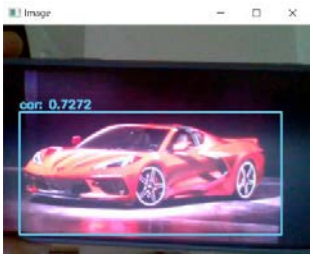

Fig 5: Object Recognition of Car

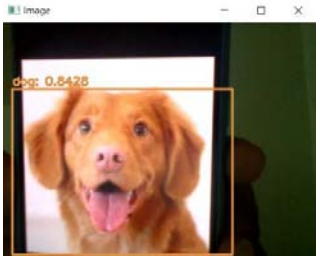

Fig 6: Object Recognition of Dog

Figures 3, 4, 5, and 6 show the sample output, which shows identified objects with bounding boxes, labels, and confidence ratings. These photos were captured for the purpose of object detection.

Table 1: Face Recognition testing

Live Input	Expected Output	Live Output	Status
Kalyan Face(clear background)	Face should recognize as Kalyan	Kalyan-Face	Correct
Kalyan Face(Normal room)	Face should recognize as Kalyan	Kalyan-Face	Correct

The live input, expected output, live output, and status of the face recognition tests are detailed in Table 1.

Input	Expected output	Live Output	Confidence score of YOLO	Status
Bottle	Bottle detected	Bottle	0.7298	Correct
Cell phone	Cell phone detected	Cell phone	0.6122	Correct
Car	Car detected	Car	0.7272	Correct
Dog	Dog detected	Dog	0.8428	Correct

Table 2: Object Recognition testing

Table 2 shows the live input, expected output, live output, YOLO confidence score, and face recognition testing status.

III. OBJECTIVE

The goal of this thesis is to create an object recognition system that can distinguish between 2D and 3D objects in a picture. The characteristics utilized and the classifier used for recognition determine the performance of the object recognition system. This study aims to present a new feature extraction approach for extracting global features and getting local features from the study area. In addition, the study work aims to combine classical classifiers in order to recognize the item.

IV. APPLICATIONS

It is both free and accessible. Real-time results are provided. Reliability, the visually impaired user may rely on the system to provide accurate results. The difference between various objects, such as a chair, a table, etc. may be clearly distinguished depending on the video quality.

V. CONCLUSION

Object categorization and localization within a scene are two of the most challenging aspects of object detection. The application of deep neural networks has aided in the identification of objects. However, implementing such strategies necessitates a significant amount of computing and memory resources. As a consequence, utilizing deep neural network designs for object detection, such as YOLO, produces positive results, demonstrating that they may be utilized for real-time object identification and face recognition, which can benefit the visually impaired.

VI. FUTURE ENHANCEMENT

For object detection at night, the camera's night vision mode should be accessible as an integrated feature. For visual monitoring, the scale of the design remains constant. When the size of the monitored object decreases over time, the background takes precedence over the tracked object. In this case, the item may not be traceable. Splitting and merging

with a single camera is not possible in all cases, resulting in a loss of content from a 3D object projection in 2D images.

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Gesture Recognition in HCI

Subtitle as needed *(paper subtitle)*

Karthikeshwar
Student, BTech in Computer Science & Engineering
REVA University
Bengaluru, India
karthikeshwar7087@gmail.com

Salony Shah
Student, BTech in Computer Science & Engineering
REVA University
Bengaluru, India
r18cs529@cit.reva.edu.in

Siddhanta Mandal
Student, BTech in Computer Science & Engineering
REVA University
Bengaluru, India
siddhantamandal2015@gmail.com

Prof. Nikhil S Tengli
Assistant professor, School of Computer Science & Engineering
REVA University
Bengaluru ,India
nikhil.tengli@reva.edu.in

Abstract— **Our work is about gesture recognition software and its applications in Human-Computer Interaction (HCI). We aim to develop a software which can enable the user to control the computer with just hand gestures. This makes interaction with the computer more intuitive and natural. Computers are being used more than ever before and the complexity of user applications and use cases has also increased. This demands for news ways of HCI. Augmented and Virtual Reality (AR & VR) is also being touted as the future of computing, which means the traditional methods of screen touching, mouse and keyboards can't be used in those cases. In that case, hand gestures can be very helpful. Our gesture recognition software shall be a GUI application, developed for Windows, macOS and Linux (major distributions). The app can be used to customize what action a gesture performs. The user can also add a custom gesture and assign a specific task to that gesture.**

Keywords-computer vision; gesture recognition; human-computer interaction

I. INTRODUCTION

Gesture Recognition technology has been shown in movies (like Minority Report) as a sci-fi technology of the future [1]. But it failed to gain traction due to various reasons: (a) Lack of technology, powerful enough hardware [2]. (b). Even with good hardware, recognizing and tracking the gestures is hard, owing to (i) background noise, (ii) poor lighting conditions, (iii) different gestures recognition [3]. Social acceptability is also one of the main issues [4]. This is why popular products like Microsoft Kinect [5] and Leap motion controller failed [6].

But the main interaction methods of the personal computer has remained the same since Apple launched the Apple II in 1977. But the usage of computers and the use cases has increased in complexity [7]. Also, according to various research areas and R&D news leaks, Augmented and Virtual Reality (AR & VR) are said to be the future of computing [8]. When it comes to AR & VR, traditional methods of HCI like the mouse, keyboard and even screen touch technology is of much lesser help. Hence there is a need for new ways of HCI and the most natural one among them is hand gesture recognition.

II. LITERATURE SURVEY

A. Types of Gesture Recognition

There are various ways in which gesture recognition can be done: (A) Hand gesture recognition (B) Facial gesture recognition (C) Sign language recognition (D) Device gesture technology (recognizing gesture with the help of a device attached to the user, e.g. a wrist band) (E) Electric field sensing [3]. Mainly, two types of gesture recognition is possible: (i) Offline gestures: gestures are processed after the user has interacted with the device. (ii) Online gestures: Gestures are processed on-the-go, used mainly for directly manipulating objects/cursor/pointer/etc. [9] The whole idea of gesture recognition stands is based on the idea of Touchless User Interface (TUI) [10]. TUI is especially useful in case of AR & VR where we need to interact with 3D objects or real-world objects. TUI is also helpful in situations like the COVID-19 pandemic [11].

B. Gesture Taxonomy

In gesture recognition, all hand movements can be broadly classified into (i) gestures and (ii) unintentional movements [12]. Recognizing the gestures from unintentional movements is the most basic task of a gesture recognition system. The gesture

taxonomy as developed by Quek [13] and further modified by Pavlovic et al. [12] can be slightly modified and represented in a better way as shown in Fig. 1.

C. *Spatial Modeling of Gestures*

Gestures can be modeled in 2 ways [12]: (i) 3D model based: this requires sensors like the infrared sensor, in addition to, or without a webcam. The 3D models can be either skeletal based or volumetric. Products like Microsoft Kinect and Leap Motion controller use this method. (ii) Appearance based: This uses mostly the camera to capture 2D images and then build the spatial model using smart algorithms or additional data. Mediapipe does spatial modeling of gestures using this method [15].

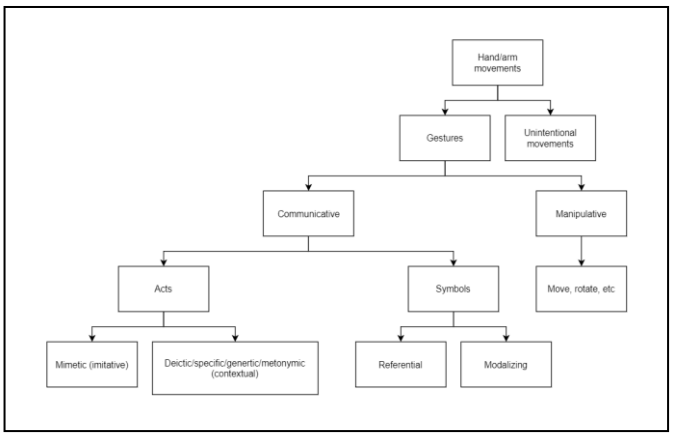

Figure 1. Gesture taxonomy

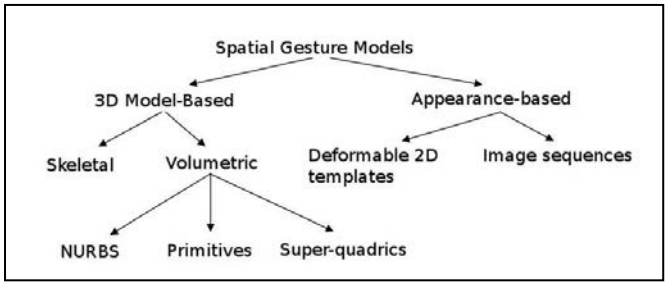

Figure 2. Spatial Gesture Modeling (source: [14])

III. DESCRIPTION

D. *Application Architecture*

The work consists of a Main window (class) which has GUI and visible to the user. It offers several options, including enabling/disabling of the gesture recognition software. Main windows has 4 tabs: (i) Home tab: Toggle all gestures, toggle mouse gestures, toggle preview of gesture recognition. (ii) Gestures tab: displays all the gestures and helps to preview them. (iii) Help tab: a section on how to use the app. (iv) Settings tab: Change the action performed by any of the gestures. This is just the skeleton of the prototype app.

The backend of the app is a separate class called Core app. It handles the gesture recognition task. It uses threading and runs in the background.

E. *Gesture recognition*

Gesture recognition is done with the help of a framework called Mediapipe [15]. Mediapipe first detects the hands (mainly palms) using single shot detector model [15]. It then tracks them, instead of doing recognition every frame. When a hand is recognized, it further detects 21 hand landmarks (e.g. index finger tip, wrist point, etc.). It gives the location of each of these hand landmarks through a function.

The framerate or frames per second of the hand recognition and tracking can be increased by using threading.

F. *Mouse pointer recognition*

Trajectory based mouse pointer control has already been proposed by K. Machanda and B. Bing [16]. Here we propose a simpler algorithm.

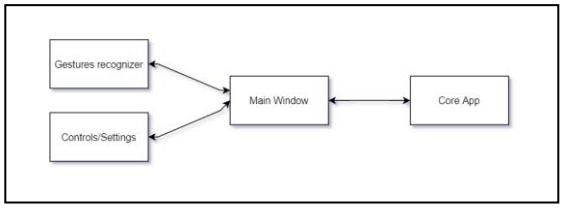

Figure 3 Architecture of the application

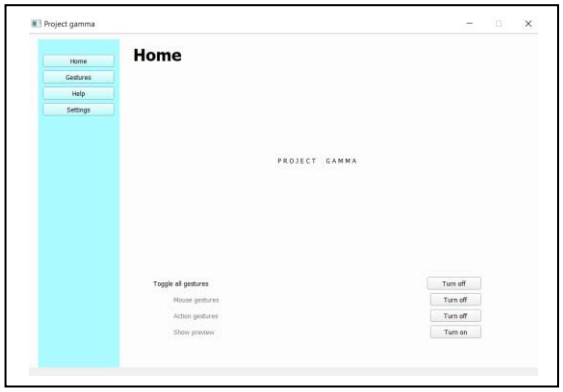

Figure 4. Application screenshot

Pseudo code:

```
// start of algorithm
Function mouse_pointer_movement():
        if only index and thumb fingers are open:
                x = curr_index_tip_x - prev_index_tip_x
                y = curr_index_tip_y - prev_index_tip_y
                x = x * (SCREEN_WIDTH / frame_WIDTH)
                y = y * (SCREEN_HEIGHT / frame_HEIGHT)
curr_x_coordinate = prev_x_coordinate + x
                curr_y_coordinate = prev_y_coordinate + y
                move_mouse_pointer(-curr_x_coordinate, curr_y_coordinate)
                prev_x_coordinate = curr_x_coordinate
                curr_y_coordinate = curr_y_coordinate

Function for_each_frame_receive_from_webcam:
        mouse_pointer_movement()
// end of algorithm
```

As shown below, our method takes less amount of time for detection of a single frame, as compared to Lucas Kanade's method (LK) and Motion of History Images (MHI) method. Since we use the latest Mediapipe [15] framework, our accuracy (95.7% for palm detection) is much better than the other two methods, while performing better too, thanks to threading [16].

Milliseconds required to process 1 frame:

FPS counting method:

```
curr_time = time.time()
if curr_time - prev_time> 0:
        fps = 1 / (curr_time - prev_time)
    else:
fps = 0
prev_time = curr_time
```

Figure 5. Application preview screenshot

IV. Modules Identified

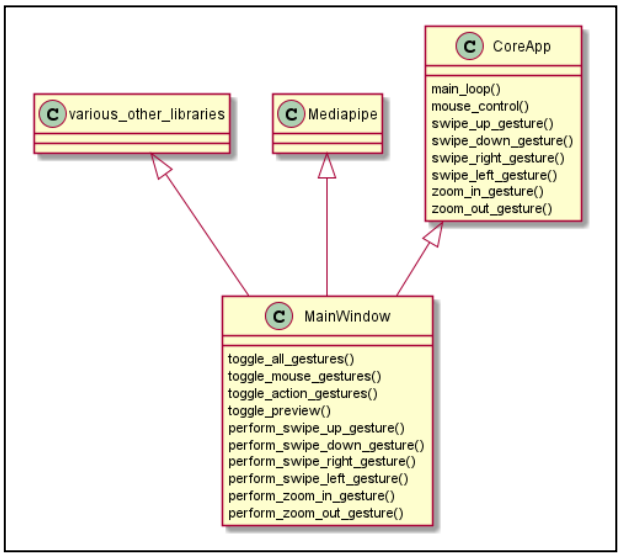

Figure 6. Modules of the application

The different classes and their dependencies has been summarized in Figure 6. The MainWindow depends on CoreApp, Mediapipe and various other libraries including PyQt5, pynput, OpenCV and PyAutoGUI.

V. Results

Milliseconds required to process 1 frame:

Table 1. Performance comparison [16]

	LK (ms)	**MHI (ms)**	**Our method (ms)**
Accuracy	Less than MHI	70%	95.7%
Resolution 640x480	110	65	11
Resolution 320x240	75	45	14

VI. Conclusion

Ways of interacting with the computer hasn't changed much since the bloom of the personal computer itself. But computer usage has only been increasing. With the new age of AR & VR, gestures could be the main method of interaction. Hence gesture recognition has a lot of importance in future.With this work, we aim to create a shooting stem towards the future of HCI.

VII. Future Enhancement

The application can be further improved by further increasing the accuracy. More hand gestures can be added as optional features. The ability to add a custom (user defined) gesture can also be added to provide more flexibility and customizability.

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AUDIOBOOK OF PRECISE SUMMARY USING DATA SCIENCE

[1] Abhya Singh
[2] Prof. Manju More
[3] ShahriarSaheen Ahmed Choudhur
[4]AbhishekRjendran,

[2]Assistant Professor,[1][3][4] Student,
School Of Computer Science And Engineering,
Reva University

***Abstract*—**Due to advancement in technologies, such as AI ,ML,deep learning and NLPfields in computer science, the demand for automation has increased drastically.Gradually, AI is making high growthin the field of Audiobook industry. BookSnap, a web-application platform aimsatknowingthe gist of any book in a short span of time in the form of short audiobooks starting with Hindi language. Based on Machine Translation(MT), a given piece of text , is translated from source language to the target language. Text-to-Speech Synthesiser technology is used to convert these short snaps into audiobooks.Having made audiobooks available in Hindi will fill a gap for those who are not very fluent in English or are more comfortable with Hindi language. This paper will not only save people's time but will also help the differently abled people (Blind). Providing the audiobooks of precise summary in Hindi language will also help a vast group of people gain maximum insights of the book. Aim and Goal is to educate more and more citizens and help them make their lives productive.
BookSnap algorithms such MLIR, MLDR, MDC, the Multi-8 two-years-on retrieval challenge, and the Multi-8 results merging task are discussed in this research.

INDEX TERMS:MDC,MLIR,MLDR,differently abled people(Blind),NLP,MT,Text-to-speech,Multi-8 two-years-on retrieval task, Multi-8 results Merging task

I.1. INTRODUCTION

Over the last few years, the Audiobook Industry has immensely expanded significantly. Audible and Spotify have changed and are changing millions of lives.With the advancement of technologies people can now access the knowledge of books in the form of audiobooks in hours or minutes on their smart-phone, tablet/ipad, loudspeakers and other electronic devices.The journey of AI is a vast one ,especially when it comes to match the quality of human performance. TTS technologies plays a vital role to convert text into speech and these days due to the advancement in AI field TTS technologies are sounding more natural. This is a long struggle of many leading companies to improve the voices of their AI personal assistants. The features of these systems lacks the nuances of human speech and therefore sounds robotic. Thus, at this point, DL enters the scenario.The audiobook industry is gradually gaining advantages from the audio system technology, submitted by Amazon as a patent. Lyrebird, clones human sounds using AI technology that gives us the feature of having the option to alter the narrator's accent according to the listener's choice.[1]
The Text-to-Speech synthesis are rapidly growing in the AI Industry. Utilizing the right AI voice generator, voice chatbot can avoid inaccuracies and sound more realistic. TTS technology is gaining popularity among the different ventures in the recent years, as it saves a lot of time and cost. [2]
Natural Language Processing (NLP) is one of the disciplines of Artificial Intelligence (AI) technology that is gaining popularity. The design of computational models that process and understand natural language is the focus of this discipline. NKP models effectively teach the computer how to grasp semantic grouping of objects (for example, the terms "cat and dog" and "cat and bat" are semantically quite similar), text to speech, language translation, and so on.It is possible for a computer to understand, interpret, and utilise human languages and vocal speech like English, German, or another "natural language." Natural Language Processing (NLP)." Today, a wide range of NLP applications may be found in use.
This article contains information like history, architecture, working, mathematical representation, about the different types language translation algorithms and models like MLIR,MLDR,document clustering.

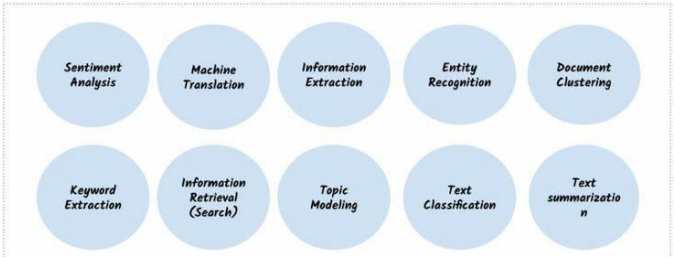

Fig.1 : Different Applications of NLP
Reference :https://in.pinterest.com/pin/536632111861377473/
(Opinosis Analytics)

In the given figure above we can see the variety of domain and applications supported by NLP.Speech recognition, dialogue systems, information retrieval, question answering, and machine translation, for example, have begun to transform the way individuals identify, retrieve, and use information resources.Artificial Intelligence is a type of Natural Language Processing.Statistical learning, in which you train your computer to learn patterns in English, is one amongst the most complex techniques. You could even create your programme once and train it to work in a variety of human languages if you do it this way.
The goal of NLP is to make human languages understandable so that a computer can interpret and comprehend the writings. The manuscript is the language script provided to the programme, and the machine is the programmed mechanism. As a result, the computerised algorithm extracts linguistic data as digital knowledge.Rather than using statistical learning models, the computer converts the language features into a rule-based, statistical technique that may be used to solve specific problems and execute the task of language processing.The components of analysis, transfer, and synthesis were not always clearly separated in many older systems, notably those of the 'direct translation' kind. They also combined data (dictionary and grammar) with processing rules and routines in some cases.New systems have shown varying degrees of modularity, allowing system components, data, and programmes to be altered and updated without compromising overall system efficiency. The reversibility of analysis and synthesis components, which means that the data and transformations employed in the analysis of a particular language are applied in reverse when synthesising texts in that language, is another level in several modern systems.[3]

2. LITERATURE REVIEW:

In the comparative study: Wei Gao, Cheng Niu, Ming Zhou, and Kam-Fai Wong used the Learning-to-Rank (L2R) framework to approach Web MLIR Ranking.Existing methods focus on collecting relevance scores from multiple retrieval settings, rather than learning the ranking function directly. As a result, the authors used the Web MLIR Ranking technique. Joint ranking models can be built by taking advantage of document correlations to estimate the chance of all documents being relevant together. This technique can be used to boost the relevance estimate of papers in a wide range of languages by utilising a relevant document in one language. Mean average precision and other information retrieval assessment metrics are directly enhanced by training model parameters to detect relevant documents more correctly. The study seeks to find a way to integrate the incomparable scores associated with each group of outcomes.To obtain the final ranking score, the scores are normalised using methods such as Min-Max, Z-score, CORI, and so on, and then merged using CombSUM or logistic regression. When it comes to MLIR relevance, they still focus on changing the scores of documents from various monolingual result lists, rather than directly modelling many aspects.The authors concluded that the new models, which are based on a generic ranking mechanism, first identify important subjects among recovered documents and then cooperatively identify relevant documents and topics based on content similarities. As a result, there is a huge improvement in ranking.[4]
Santosh GSK, Kiran Kumar N and VasudevaVerma have mentioned about the MLDR approach. By using Bilingual dictionary as their primary language resource, they were able to extract a variety of monolingual and multilingual similarity traits. They used the FIRE (Forum of Information Retrieval Evaluation) to do tests on different ranking algorithms and compare the results. The results suggest that the elements addressed in improving Multilingual Document Ranking are successful (MLDR).To summarise, the authors improved the MLDR performance from a QA standpoint, which outperformed the BM25 baseline by a significant margin. They're currently using the FIRE – 2010 datasets to extend the method to different Indian languages.[5]
Luo Si and Jamie Callan introduced 2 tasks namely :There have been two instances of this merging: the retrieval of Multi-8 data two years after it was first collected and the combining of Multi-8 findings. The Multi-8 two-years-on retrieval and the Multi-8 results merging tasks are two of the CLEF 2005 assessment tasks described here. The major goal of the Multi-8 job is to produce and aggregate multilingual search results based on basic bilingual or monolingual ranked lists.. Their efforts are mostly focused on multi-8 merging. The Multi-8 results merging job tries to create a multilingual ranked list by combining two lists of eight bilingual (or monolingual for English) ranks.Indexing and translation of the highest-rated texts in each ranking list is used to get scores that are comparable

across lists. As a result of this research, specialised and language-specific logistic models have been developed for these articles. All articles in ranked lists in different languages were sorted according to these logistic models, which were designed to estimate similar document scores for all publications. Research using the recommended methodology surpass previous studies and only require as little as 10 documents each pair (e.g., 10 per pair) to deliver correct conclusions.[9]

In the paper : Multilingual Wordnet sense Ranking using nearest context, authors have introduced OMW(Open Multilingual Wordnet) that has over 150 different languages with word-nets built automatically. Multiword expressions from wordnets are used to train the pre-trained models Word2Vec and Polygot2. This allows the multiword expressions to be rated as well. As a consequence, this model has been trained to produce embeddings for single and multi words. Five languages are represented in the lexicon's WSD. Semcor sense corpora in five languages are used to test the results using the Word2Vec and Glove model. Compared to Word2Vec, the Glove model has an average accuracy of 0.47 for languages including English, Italian, Indonesian, Chinese, and Japanese. Ranking correlation is mostly dependent on human ranks, as according studies using OMW sense ranking A distributional semantics method to Wordnet Sense Ranking may be helpful.[8]

On similar corpora, Kiran Kumar N, Santosh GSK, and VasudevaVerma discussed Multilingual Document Clustering (MDC). Wikipedia is a great example of a multilingual information repository, with 257 language versions now available. The authors of this research have conducted a thorough examination of several methods for maximising MDC's effectiveness by utilising its vast multilingual knowledge base.Bilingual dictionaries are used in the paper's proposed effort to translate Japanese and Russian papers into English (anchor language). Because of the time commitment, it is not always preferable to translate a complete document into an anchor language.[7]

3. MLIR (Multilingual Information

Retrieval)

[4]Searching for documents in many languages is possible using MLIR. A bilingual dictionary, machine translation software, or a parallel corpus can be used to translate requests prior to their monolingual reply.In order to properly combine numerous ranked lists from various languages, re-ranking is then used. The necessity to compare and integrate material in several languages makes it challenging to do multilingual information retrieval (MLIR) for websites. As a result of the information that is lost when queries are interpreted, it is difficult to determine cross-lingual relevance.[4]

i.Learning for MLIR Ranking

The aim of the MLIR ranking learning system is to develop a unique ranking function that can estimate the same scores for articles published in numerous languages with different accents and terminology. It is essential to build a multilingual feature area for the materials. For MLIR ranking, current monolingual L2R algorithms can be employed with these characteristics. In this case, we assume that each query $q \in Q$ (Q is the provided query set) is connected with the list of retrieved documents Dq = {di} where di is the rank label of di and may take one of m ranks in the R set R = "r1, r2,...,rm" (r1 r2 ... rm, where denotes the order relation). As a result, the training corpus may be described as {q ∈Q|Dq, Lq}. we designate each query-document pair by denoting Φ [fk(q, di)]: " f(q, di)" If we choose K k=1, then fk is one of the relevant feature functions for our analysis (q, di). The ranking function F: Φ → will be used to assign a relevance score to each recovered document's feature vector (which represents the real value space). When Dq is ordered according to F, the order of the documents is indicated by an integer permutation (q,Dq,F), and the position of di in the results list is reflected by an integer permutation (di). As a consequence, the ranking aim refers to the search for an optimum function: argminF = F For all queries, q E(π(q,Dq, F), Lq) minimises an error function E representing the discrepancy between π(q,Dq, F) and the appealing rank order supplied by Lq. Different algorithms for ranking employ the ranking function and the error function in different ways. Probabilistic classification (e.g., Support Vector Classifier) and metric regression may be used to rate documents (e.g. Support Vector Regression). SVM (large-margin ordinal regression), RankBoost, RankNet, and other ranking algorithms all try to maximise the pair-wise loss and estimate the order of relevance between two articles based on order preference. [5–6].SVM-MAP [20] has recently been presented to directly improve the IR assessment metric – Mean Average Precision – directly (MAP).[4]

ii.Joint Ranking Models for MLIR

This task might be made more difficult by the query translation problem when using monolingual ranking algorithms. A collaborative ranking approach that uses the relationship between papers/documents authored in multiple languages is offered in addition to query-document relevancy. To estimate the joint relevance probability distribution, the Boltzmann machine (BM) simulates any relationship between items.

a) Boltzmann Machine (BM) Learning

Nodes in a BM's state vector can travel in any direction, and as a result, it can make random predictions about the values they will take as they do so. s = [s1s2...sn], where si = ±1 is the state of node I and n is the total number of network nodes. In layman's terms, it is described as follows: Wij is the edge weight of node I in relation to node j and sisj is si's threshold in E(s) = 1 2 ijwijsisj = 1 θisi..The probability of finding the network in a global state after a significant period of time in the dynamics process is dependent only on the states of the nodes and their neighbours, and follows the Boltzmann distribution, which is P(s) = 1 Z exp(-E(s)), where Z is the normalisation function for all possible states.As a result of machine training, the Boltzmann distribution will begin to look more and more like P˜(s).Kullback-Leibler measures the difference between the two distributionsK(P˜||P) = s P˜(s) log P˜(s) P (s) .Using gradient descent, the divergence should be reduced. This sort of weight-updating rule may be obtained.:

Δwij = α(<sisj>clamped − <sisj>f ree) (1)

Δθi = α(<si>clamped − <si>f ree) (2)

b) Joint Relevance Estimation Based on BM

For each q, we denote $\mathbf{sd}_q = [sd_i]$ and $\mathbf{st}_q = [st_j]$ as the state vectors of the document and topic nodes respectively, then the energy of the machine becomes:

$$E(\mathbf{s}, q) = E(\mathbf{sd}_q, \mathbf{st}_q, q) = -\sum_i \Theta \cdot \mathbf{f}(q, d_i) sd_i - \frac{1}{2}\sum_{i,j} \mathcal{W} \cdot \mathbf{g}(d_i, t_j) sd_i st_j \quad (3)$$

where $\mathbf{f} = [f_x(q, d_i)]_{x=1}^{X}$ and $\mathbf{g} = [g_y(d_i, t_j)]_{y=1}^{Y}$ are the X-dimension feature vector of query-document relevancy on document nodes and the Y-dimension document-topic relevancy on edges respectively, and Θ and $\mathcal{W}$ are their corresponding weight vectors. Then the probability of the global state $P(\mathbf{s}, q) =$

$P(\mathbf{sd}_q, \mathbf{st}_q, q)$

c) Multilingual Clustering for Identifying Salient Topics

The measure of cross-lingual document similarity is widely used because of its simplicity and efficiency. A cosine-like function with an expansion of TF-IDF weights is utilised for cross-lingual keyword translation. The following is an explanation of the metric at issue:

$$sim(d_1, d_2) = \frac{\sum_{(t_1,t_2)\in T(d_1,d_2)} tf(t_1, d_1) idf(t_1, t_2) tf(t_2, d_2) idf(t_1, t_2)}{\sqrt{Z'}} \quad (4)$$

where Z' is given as

$$Z' = \left[\sum_{(t_1,t_2)\in T(d_1,d_2)} (tf(t_1, d_1) idf(t_1, t_2))^2 + \sum_{t_1 \in \overline{T}(d_1,d_2)} (tf(t_1, d_1) idf(t_1))^2 \right] \times \left[\sum_{(t_1,t_2)\in T(d_1,d_2)} (tf(t_2, d_2) idf(t_1, t_2))^2 + \sum_{t_2 \in \overline{T}(d_2,d_1)} (tf(t_2, d_2) idf(t_2))^2 \right]$$

$T(d_1, d_2)$ denotes the sets of word pairs where t_2 is the translation of t_1, and t_1 (t_2) occurs in document d_1 (d_2). $\overline{T}(d_1, d_2)$ denotes the set of terms in d_1 that have no translation in d_2 ($\overline{T}(d_1, d_2)$ is defined similarly). $idf(t_1, t_2)$ is defined as the extension of the standard IDF for a translation pair (t_1, t_2): $idf(t_1, t_2) = \log\left(\frac{n}{df(t_1)+df(t_2)}\right)$, where n denotes the total number of documents in two languages and df is the word's document frequency.

d) BM trainer as a classifier

Gripper and free phases are alternated in order to avoid maxima, which must be done multiple times with different start masses. State values of hidden units are determined during the clamping phase in contrast to output units whose status is established by human labels. model is used for both stages.

The training is to adjust the weights and thresholds in such a way that for each query the predicted probability of document relevancy, i.e., $P(\mathbf{sd}_q, q) = \sum_{\mathbf{st}_q} P(\mathbf{sd}_q, \mathbf{st}_q, q)$, approximates to the target distribution $\tilde{P}(\mathbf{sd}_q, q)$ as closely as possible, where $\tilde{P}(\mathbf{sd}_q, q) = \begin{cases} 1, & \text{if } \mathbf{sd}_q = L_q; \\ 0, & \text{otherwise} \end{cases}$ is obtained from the training data. By minimizing the *K-L Divergence*, we obtain the updating rules

$$\Delta\theta_x = \alpha \sum_{q,i} f_x(q, d_i) \left(< sd_i >_{clamped} - < sd_i >_{free}\right) \quad (5)$$

$$\Delta w_y = \alpha \sum_{q,i,j} g_y(d_i, t_j) \left(< sd_i st_j >_{clamped} - < sd_i st_j >_{free}\right) \quad (6)$$

e) BM interface for MLIR Ranking

A node's state distribution in the mean field approximation is exclusively dependent on the states of its adjacent nodes, each of which is set to its average state value. As a result of this, here's what we already have::

$$P(sd_i = r) = \frac{\exp\left[\sum_j \mathcal{W} \cdot \mathbf{g}(d_i, t_j) < st_j > r + \Theta \cdot \mathbf{f}(q, d_i) r\right]}{\sum_r \exp\left[\sum_j \mathcal{W} \cdot \mathbf{g}(d_i, t_j) < st_j > r + \Theta \cdot \mathbf{f}(q, d_i) r\right]} \quad (7)$$

$$P(st_j = r) = \frac{\exp\left[\sum_i \mathcal{W} \cdot \mathbf{g}(d_i, t_j) r < sd_i >\right]}{\sum_r \exp\left[\sum_i \mathcal{W} \cdot \mathbf{g}(d_i, t_j) r < sd_i >\right]} \quad (8)$$

$$< sd_i >= \sum P(sd_i = r) r \quad (9) \qquad < st_j >= \sum P(st_j = r) r \quad (10)$$

The relevance probability of a document is calculated using the average rank labels for all topics in Equation (7). Eq. (8), on the other hand, uses the average rank labels of all articles to estimate the topic's relevance probability. Eqs. (9) and (10) use the probability distributions produced in Eqs. (7) and (9) to estimate the average rank labels (8).
There is a fixed-point solution method for the iterative method of solving the mean field equations (7)–(10).
1. Assume that each node has an average state value.
2. Eqs (7) and (8) could be used to estimate the probability of each node's state value based on the average values of its neighbours.
3. Update each node's average state values using Eqs. (9 and 10).
4. Step 2 must be repeated until the average values of the states are in agreement..

f) BM training with MAP Optimization
The MAP represents the average of all the queries' average precision.Rather than simply maximising MAP, we aim to achieve the following:

$$MAP - C \sum_y ||w_y||^2 - C \sum_x ||\theta_x||^2 \quad (11)$$

The L-2 regularisation terms in the model's last two terms describe its level of complexity. C. handles the trade-off between model correctness and complexity. L-2 norm and MAP loss hinge relaxation were minimised by using the same strategy as in the previous paper. Because MAP is not a continuous function, the Powell's Direction Set Method is used instead, which eliminates the need for any derivation calculations.To acquire the best results using Powell's method, the BM's weights are altered several times.In order to improve classification accuracy, we train the BM with a certain set of starting weights (d). In model inference, the mean field approximation (e) is also used.

iii) Results

The suggested MLIR ranking algorithms were tested in the field. Both Chinese and English multilingual Web search data and TREC5&6 English-Chinese CLIR data were used in the research. The ScoreComb ranking score combination method serves as a basis. When learning how to rank Chinese and English texts separately, several methods such as Ranking SVM and SVM-MAP are used. It is then used to aggregate the scores using a log regression model.
In order to examine the MLIR ranking's performance, three common L2R methods were utilised: SVM classifiers include SVC (SVM classifier with probability estimate), RSVM (Ranking SVM), and SVM-MAP.There are three basic kinds of ranking strategies for these algorithms: First, there's the widely used SVC algorithm; second, there's the cutting-edge RSVM technique, which uses paired-wise preference order classification; and third, there's the SVM-MAP algorithm, which ranks by optimising the IR relevance directly.
Comparisons are made between the BM classifier (BM) and the BMC-MAP classifier (BM classifier with MAP optimizer).We removed the hidden units and edges from the BMC and BMCMAP models and used the resulting log linear models to directly examine the role that relevance plays in the data. As a consequence, LOG and LOG-MAP are the two extra systems to be evaluated.

a) Experiments on TREC CLIR data

Cross-lingual document similarity is a focus of our work at CLIR. The CLIR job for TREC5 and TREC6 is defined as the retrieval of Chinese materials using English inquiry.

Combining translations from three free machine translation engines, Okapi-BM25 (BM25) retrieves Chinese content from English queries. There are 25 regularly used query-document relevance models implemented to train the ranking models using translations of the queries and scores from TFIDF and BM25 and language modelling IR, etc. The original query is used to acquire English documents from TIPSTER, and the BM25 scores are used to create BM for the joint relevance rating. Twenty documents are chosen and given one of two labels due to the lack of a relevancy annotation in English: 0 for the last 10 documents in the result; 1 for the first 10 documents.

recall	BM25	SVC	RSVM	SVM-MAP	LOG	BMC	LOG-MAP	BMC-MAP
0	0.658	0.736	0.788	0.798	0.715	0.796	0.797	0.815
0.1	0.495	0.476	0.531	0.598	0.475	0.583	0.592	0.591
0.2	0.411	0.393	0.427	0.486	0.391	0.469	0.480	0.502
0.3	0.345	0.354	0.385	0.414	0.349	0.412	0.411	0.423
0.4	0.289	0.324	0.346	0.368	0.324	0.367	0.366	0.376
0.5	0.251	0.282	0.299	0.316	0.281	0.312	0.315	0.323
0.6	0.203	0.222	0.241	0.245	0.214	0.247	0.241	0.269
0.7	0.164	0.174	0.200	0.185	0.175	0.183	0.182	0.220
0.8	0.074	0.099	0.101	0.086	0.099	0.088	0.084	0.107
0.9	0.010	0.020	0.027	0.016	0.018	0.017	0.016	0.030
1.0	0.002	0.007	0.012	0.006	0.004	0.007	0.006	0.008
AP	0.249	0.253	0.280	0.301	0.250	0.299	0.299	0.314

Table1 : TREC6 CLIR performance by 11-point precision-recall and AP measure

As indicated in Table 1, the CLIR results are presented using AP and an 11-point precision-recall measurement. BM25 is used to evaluate the translated query's quality to Chinese material because there is no multilingual result merging.

This was confirmed by t-testing, which showed that BMC beat the LOG ($p = 0.009$) and the RSVM ($p = 0.011$). CLIR performance can be improved by using insights from monolingual IR studies. SVM-MAP and LOG-MAP to BMC-MAP AP improvements aren't as significant as the leap from LOG to BMC.The optimization of Eq(11) may have resulted in less benefit than initially expected. BMC-MAP training, unlike SVM-MAP training, does not provide a global optimum. BMC-MAP surpasses SVM-MAP by 4.15 percent despite the fact that it has received less learning.

b) MLIR experiments on web-search data

Search results that are available in a variety of languages. Our Web search data comes from commercial search engine query records. Separate records are kept for queries in English and Chinese.. Retrieved web sites are rated on a scale of 0 to 5, with 0 being the most irrelevant and 5 being the most relevant (excellent). In order to extract query-dependent properties, we use the query and four separate sources for each web page of a given query: the anchor text, URL, document title, and content. PageRank, for example, is a query-independent property that is also extracted. Each of the two languages has a total of 352 of these characteristics.

The Chinese log includes both the original English log and translations thereof. A multilingual ranking corpus is built using the results of these searches and the labelled results The appropriate Chinese and English websites are put together for an English-language search. There are 32,049 pages of English and 17,791 pages of Chinese in the entire collection.

The MAP, precision@1, 5,10, and NDCG@1,5,10 (NDCG—Normalized Discounted Cumulative Gain) were all successful, as illustrated in Figure 1. In general, multilingual feature space models outperform the simple ScoreComb model in terms of results. All improvements are statistically significant, as shown by the t-test (p 0.05). In this case, L2R approaches show their value in training appointed head straight from features..

RSVM is considered to perform better than SVC since it optimises the ranking order of document pairings. The MLIR results confirms on this. BMC gets comparable results with RSVM, as does TREC, showing that classification-based ranking algorithms can perform as well as state-of-the-art ranking models by utilising the relevancy among individual documents. Surprisingly, SVM-MAP performs worse than RSVM. That the RSVM can use fine-grained 6-level relevance whereas the SVM cannot is one plausible cause.

The BMC-MAP model is the best. To put it more simply, it outperforms all of the other models by at least 30.22 % ($p = 0.003$) and by at least 15.12 % ($p = 0.006$), the SVC, the BMC, the RSVM, and the SVM-MAP by at least 7.40 % ($p = 0.009$) in terms of the measure of mean overall performance.

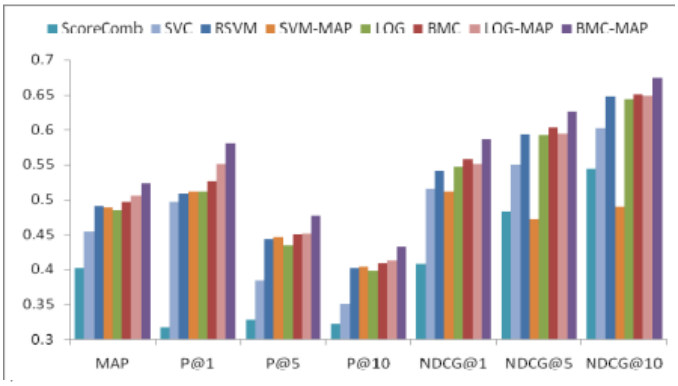

Fig.2: Comparison of ranking results using Multilingual web search data

	MAP	P@1	P@5	P@10	NDCG@1	NDCG@5	NDCG@10
LOG	0.484	0.511	0.435	0.397	0.546	0.591	0.641
BMC	0.497	0.527	0.451	0.409	0.557	0.604	0.651
LOG-MAP	0.504	0.552	0.452	0.413	0.551	0.594	0.649
BMC-MAP	0.523	0.580	0.478	0.432	0.587	0.626	0.674

Table 2 : The comparison results of using and without using clusters in BM models

Compare BMC with LOG, as shown in Table 2, to see how well the combined ranking model performs (LOG-MAP). When comparing the BMC-MAP difference to the BMC-LOG difference, the impact of inter-document relevance can be readily seen.

IV) MLDR(Multilingual Document Ranking)

By extracting simple and efficient characteristics from multilingual texts and themes, the performance of Multilingual Document Ranking (MLDR) is enhanced. In order to enhance MLDR, it is possible to use commonalities between candidate documents for comparison. Similar papers often score similarly, making crosslingual relevant documents a useful tool for estimating crosslingual relevance. Various similarity metrics between documents in the same language and documents in other languages may be obtained from result lists in two separate languages and their queries.. Using the same set of similarity measures, both monolingual and multilingual texts may be assessed and compared to one other.

Only bilingual dictionaries are utilised to calculate the multilingual document similarity. External knowledge sources, such as Wikipedia, are also used to improve the effectiveness of similarity measurement. If the fundamental language resource (bilingual dictionary) is available, this technique may be expanded to additional language pairs.

The test was performed on the FIRE 2010 corpus. Experiments are carried out using the derived features to model multiple ranking systems.The NDCG is used as the evaluation metric to compare their results. There may be a considerable real improvement compared to utilising the BM25 baseline ranking method.

To meet the cross-lingual document retrieval challenge, the FIRE 2010 dataset includes newspaper articles from regional news sources in the supported languages: Bengali, English, Hindi, and Marathi..In each of these languages, there are 50 query topics to choose from. For the experiments, they considered English and Hindi articles. For each topic-document pair, only binary relevance judgments are supplied. All of the relevant papers for each subject were collected into a single group of files that included some irrelevant information. The quantity of noise examined is twice as much as the number of documents that are relevant.

SVC (SVM Classification), RSVM (Ranking SVM), SVM Regression, and Logistic Regression are used to learn ranking functions by modelling the characteristics that are obtained.Logistic regression is carried out using the source codes of LibSVC2, SVMLight3, SVM-Rank4, and Logistic Regression5.. These learning algorithms' predicted probabilities are utilised to rank the documents.Human labellers use a scale of 0 (irrelevant) to 5 (very relevant) to verify the publications' position in the rankings (excellent).It is necessary to use the results of the NDCG@5,10,15,20 test to compare the two systems..

Method	NDCG@5	NDCG@10	NDCG@15	NDCG@20
SVC	67.99	73.53	76.28	79.50
SVM-Reg	71.00	77.87	77.94	**82.11**
RSVM	**75.04**	**78.84**	**78.03**	79.83
LogReg	69.89	74.53	76.69	80.37
BM25	64.19	69.38	68.82	72.21

Table 3 : Comparison of MLDR performances

A glance at Table 1 reveals that the BM25 system was surpassed by all the learning algorithms. In terms of performance, our ranking functions are on par with the baseline system. MLDR's performance has greatly improved.The best results were produced via ranking SVM and SVM regression. These precisions indicate that the characteristics under consideration have shown to be beneficial in improving MLDR performance.

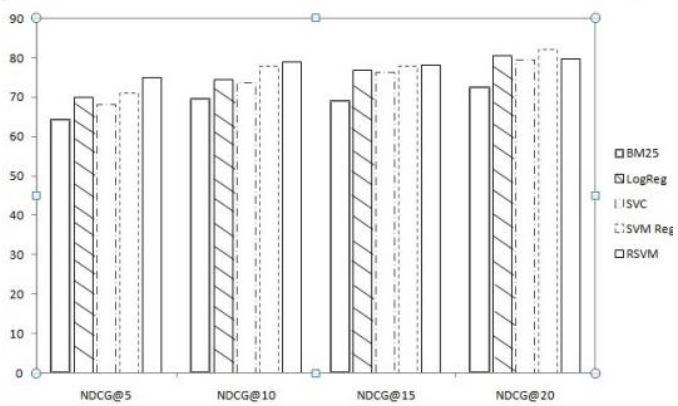

Fig.3: Graphical comparison of performances of ranking algo.

IV)MDC (Multilingual Document Clustering)

Development of applications is necessary since more and more papers are being authored in a variety of different languages. The processing and administration of multilingual online content using MDC has shown to be quite effective. As part of MDC, n documents written in several languages are divided into many clusters, with the semantically related papers belonging to each cluster. CLIR, parameter training for statistical machine translation, and aligning parallel and non-parallel corpora are just a few of the many uses for this method.

"Bag of words" clustering ignores the semantic information included in each document when using typical text clustering algorithms. Two texts that use distinct sets of keywords to describe the same subject might be incorrectly categorised as independent works. There is a lack of shared concepts, even though the terms they use are likely synonyms or semantically linked in other ways.. Adding an ontology or external knowledge to the document representation is the most common method of overcoming this problem.

Wikipedia is one such multilingual knowledge base, with 257 language editions currently active.

i) Proposed Approach

Document vectors are used to represent the collection of English and Hindi text documents at first. To obtain new vectors, these document vectors are supplemented with Wikipedia knowledge base. For measuring document similarity, the basic document vectors and enriched document vectors are linearly merged. The similarity metric is used to create clusters for English and Hindi documents. To integrate these clusters, the centroids' similarity is measured.

a) Document representation

Both English and Hindi text documents are represented using the vector space paradigm. A "bag of words" refers to a document's keyword-based properties when no sorting information is provided..The vector's values are TFIDF scores. A stopword is one that occurs in at least 50% of the texts in a given language, as opposed to maintaining a list of such terms for each language. Despite the elimination of stopwords, the document vectors still include a small number of erroneous words. Based on their TFIDF scores, only the top-k terms in each document were examined. They experimented with k values ranging from 40% to 100% with a ten percent increment. For k=50 %, the best cluster results are obtained.

b) Document clustering

Automatic document clustering can result in highly similar documents in one group, but highly different documents in different groups.In order to categorise the enriched texts, many clustering approaches (such as Hierarchical clustering, Sectioned clustering, and so on) can be utilised. In order to combine the advantages of partitional and hierarchical clustering techniques, researchers used the Bisecting k-means strategy, which divides the largest cluster into many sub-clusters. The bisecting k-means approach's final clustering result was accomplished by selecting random fifteen k values ranging from 30 to 70 on average.

Steinbach et al. evaluated various algorithms and came to the conclusion that bisecting k-means outperforms normal k-means and agglomerative hierarchical clustering.The basic vector space model is used in the basic k-means algorithm, which is a partitional clustering algorithm. The bisecting k-means method is applied to the improved document vectors and the basic keyword vector to construct different clusters for English and Hindi texts. A basic Keyword vector, a Category vector, an Outlink vector, and an Infobox vector are all included in each page.
In order to determine if two papers di and dj are similar, the following criteria must be met:

$$sim(d_i, d_j) = sim^{basic\_keyword} + \alpha * sim^{Category} + \beta * sim^{Outlink} + \gamma * sim^{Infobox}$$

The cosine similarity of the documents di,dj is given by sim(di,dj). The sim is calculated as follows:

$$sim = cos(v_i, v_j) = (v_i.v_j)/(|v_i| * |v_j|)$$

The main keyword, category, outlink, and infobox vectors from the documents di and dj are represented by these vectors.To measure the degree to which two texts are conceptually similar, we use the coefficientsα, β and γ to reflect the importance of these vectors. Hu et al. suggested a new measure of similarity in which Wikipedia Concepts and Categories were utilised to group the monolingual publications in the equation of text similarity. For the classification and grouping of monolingual texts, Hu et al., Wang, and Domeniconi all used Wikipedia Category information.

ii) Results

A total of 1563 papers, 650 of which are in English and 913 of which are in Hindi, have been compiled from 50 different themes. F-score and Purity measures are used to gauge cluster quality. An F-score is computed based on the accuracy and recall of the data. Accuracy in an assignment can be gauged by how many correct assignments there are divided by the total number of assigned documents.
Wikipedia data: Data dumps for several languages are published on a regular basis by Wikipedia. The most recent dump, which included 2 million English and 50,000 Hindi documents, was utilised. The information was in XML format. Retrieve and analyse Wikipedia data to create a vector such as Categories outlinks, Infoboxes, and Re - direct.

Notation	F-Score	Purity
Keyword (baseline)	0.532	0.657
Keyword_Category	0.563	0.672
Keyword_Outlinks	**0.572**	0.679
Keyword_Infobox	0.544	0.661
Category_Outlinks	0.351	0.434
Category_Infobox	0.243	0.380
Outlinks_Infobox	0.248	0.405
Keyword_Category_Outlinks	0.567	**0.683**
Keyword_Outlinks_Infobox	0.570	0.678
Keyword_Category_Infobox	0.551	0.665
Category_Outlinks_Infobox	0.312	0.443
Keyword_Category_Outlinks_Infobox	0.569	0.682

Table 4 : Clustering schemes based on different combinations of vectors

Our tests using an external knowledge resource performed better than the baseline, as shown in Table 1.Categories and Infobox information have also slipped behind Outlinks information in the popularity ratings. It is vital to include outlinks in any Wikipedia article containing references to other articles (hyperlinks). Papers are reviewed at a more abstract level when looking at the Categories, which might have resulted in lower findings when compared with Outlinks. Important statistical data may be found in the Infobox of a Wikipedia page.However, the information in all of its articles is inconsistent, which contributes to its low performance when compared to others.

IV. ALGORITHMS STUDIES FOR CLEF 2005 EVALUATION TASKS

a) Multi-8 two-years-on retrieval task

Phase one of the experiment involved using a technique known as "Multi-8 two years on" to look for content in eight different languages using only one language (in this case, English queries). Multilingual search results can be fine-tuned prior to incorporating them (or monolingual results for documents written in the same language as queries).Bilingual retrieval may be performed in several instances by fine-tuning the query translation algorithms and then creating an accurate bilingual run for each bilingual run, as shown by previous research.. In the end, a multilingual ranked list is created by combining the results of the various ways. Multi-8's two-year-old retrieval challenge aims to produce and integrate multilingual retrieval results based on fundamental bilingual (or monolingual) ranked lists. A number of multilingual retrieval results can be obtained by combining bilingual (or monolingual) retrieval results using the same retrieval algorithms and then merging the multilingual retrieval results.Research shows that merging multilingual results improves accuracy significantly over single multilingual ranked lists, and this may be done in a variety of ways.

b) Multi-8 results merging task

Using the Multi-8 results merging job, an all-language rating can be generated by combining two lists of eight bilingual (or monolingual) rankings. A federated search task results merging technique has been developed by the authors to address this issue. Indexing and translating of the highest-rated texts in each ranking list is used to get scores that are comparable across lists. Logistic models for both language- and query-specific ranking lists are built using the scores of these documents.After creating and running these models, the documents were sorted using the projected similar document scores from all of the ranking lists, in all languages. A limited amount of documents (e.g., 10 per question, language >pair) has been proved to provide accurate replies using the current proposed methods.

i) MULTILINGUAL RETRIEVAL SYSTEM

Using the findings of numerous multilingual retrieval techniques, this work delivers correct results for multilingual search. ' Authors examine both query-based and document-based techniques of retrieval in the search engine landscape. Preparing text for many languages is the first step in this section. Before providing methods for integrating results from various multilingual retrieval systems, the research delves deeply into query and document translation-based multilingual retrieval algorithmic characteristics.

a) Text Preprocessing

Stopword Lists: In order to make text searchable, stopwords must first be removed.English papers are searched using the Inquerystopword list. Snowball2 is used as a stopword list for Dutch and is utilised for the rest of the European languages save Finnish and French..
After stopwords have been eliminated, different stemming algorithms are used to stem other content words. For English words, Porter stemmer is used.
Decompounding: Languages like Dutch, Finnish, German, and Swedish have a lot of compound words. All words with a length of more than three in the CLEF corpus are considered possible base words. We only evaluate base words with greater collection frequencies than the word in question to avoid overly forceful decompounding. Dutch takes into consideration connecting elements such as –s-, –e-, and –en-, whereas no linking elements are taken into account in Finnish, and elements such as –s-, –n-, –e-, and –en- are taken into account in German. Swedish also takes into account connecting elements such as –s-, –e-, and –o-. Decompounding techniques used in previous investigations have been the same.
Multilingual information retrieval systems may benefit from the usage of online machine translation systems to translate queries and material..

b) Multilingual Retrieval via Query Translation

A multilingual search can be performed by translating English inquiries into other languages, conducting a search in that language and combining the results from several languages into one multilingual list. employing parallel corpus-based translation matrices, English query phrases are translated into various languages.. In the translation matrix of other languages, each word in the English language is translated into the top three alternatives. All three

translated terms of an English phrase have normalised weights according to translation matrices (i.e., the sum of the weights is 1). Because the vocabulary of the parallel corpus is so tightly concentrated, certain English terms may not have translations in the parallel corpus at all. The online machine translation programmeSystran 4 provides word-by-word translation results as a complement. Searches in the indexes of each language are conducted using the translated queries. In the Okapi algorithm, each query phrase is weighted according to its translation representation weight..

c) Multilingual Retrieval via Document Translation

Multilingual retrieval may also be accomplished by translating all non-English materials to English and then using the same original English queries. The semantic meaning of longer texts may be better represented than the semantic meaning of short inquiries, hence this retrieval approach may have an advantage over query translation-based retrieval methods. In addition, previous study has shown that translating a phrase from another language into English and translating a word from English into this language may be effective in tandem. German words or phrases may not always have the same sense in English, but they may be translated appropriately into English.

Translators use parallel corpora to generate translation matrices to aid in the translation of documents. Each term in a language other than English is compared to the three most accurate English translations of same word in English. Untranslated words have five word spaces allocated to each of the three contenders, based on their normalised translation chances. A single database indexes and stores all translated and original English content.

d) Combine Multilingual Ranked Lists

According to the theory that various multilingual retrieval techniques prefer to return relevant publications while different case algorithms prefer to retrieve nonsensical articles, ranking lists are combined. The information retrieval field has seen the adoption of similar principles in Metasearch. The result is a simple combination strategy that favours documents recovered using several retrieval techniques as well as documents with a high rating retrieved using a single retrieval method. Assume $dr_{sk_mj}$is the resource-specific raw document score for the jth document in the mth ranked list, and that the dr_{sk_max} and minimum document scores in this list are both $dr_{sk\_m\_max}$. Following this procedure, the j^{th}document's normalised score is calculated.:

$$d_{s_{k\_mj}} = \frac{(d_{rs_{k\_mj}} - d_{rs_{k\_m\_\min}})}{(d_{rs_{k\_m\_\max}} - d_{rs_{k\_m\_\min}})}$$

4. RESULTS AND IMPLEMENTATIONS

Fig.4 : Waveform of Audiobook for “5AM Club” book Summary in Hindi Language

“The 5AM Club” book written by Robin Sharma was taken as a reference for testing the results. Using googletrans module in python, translating the summarised text of the book in Hindi was successfully achieved. After successfully translating the summarized text from source language (English) to its destination language (Hindi), we converted the text into speech using gTTS module in python. The audio waveform of the obtained audio is shown in Fig.4 above.

5. CONCLUSION

Knowledge is never ending and we strongly believe that it should reach to each and every individual regardless of the location where they stay, and the background they belong to. Knowledge is the best investment and what can be a better option than investing your time in reading a nice book? Even famous authors and leaders have openly admitted how a single book has drastically changed their lives in a positive way. Practically, it is not possible for everyone to buy each and every book and carry with them where ever they go. But, this should not become a hurdle in their way, thankfully technology is advancing every day and that’s why today we have come up with our idea of providing audiobooks, which is nothing but a summarization of the whole book and translating it in Hindi using Machine Translation (MT) technology and converting it into speech with the help of TTS syntesis, without changing the essence or altering the content of the book. The accuracy of the book summary is maintained.Emerging technologies such as AI,ML,NLP,Text-to-Speech synthesizer has been a great helping hand in the audiobook industry in the recent years. Although, TTS Synthesizer lacks the nuances of human speech, making it sound more like a robot with no feelings and expressions. Majority of TTS applications are unsuccessful at producing nuances

like expressive voice tones,pauses in between and so on, which ultimately leads to low-quality results. Researchers and developers are trying to train AI to make the speech sound more realistic using Speech-to-Speech(STS) voice cloning, AI powered technology that improves TTS Speech quality. It uses a person's speech and produces the speech in a different person's voice. For instance.: We can make our own voice sound like someone else. Our platform BookSnap will be accessible and free of cost to everyone. Our main motive to keep it for free of cost, was to make sure that everyone can benefit out of it, regardless of their background. Since it is an audiobook of precise summary, thus, it is very convinient for people to listen to it from where ever they are and whenever they want, which otherwise becomes a bit difficult when reading an actual book. The classic feature of any audiobook is that it helps one to keep track of different books they've read and they can resume from where they've last read for a particular book.

The world is progressing, but still majority of individuals don't have access to public library. Here, audiobooks play avital role. Today, we have a vast library of books and novels and it is not possible for everyone to buy each book of their choice. At this point, an audiobook of precise summary comes into picture, where it allows people to connect with their book of choice that too for free of cost.Back in 1824 Braille was invented for the differently abled (Blind), so that they are not left behind. Access to knowledge should not have any boundaries or limitations and thus, audiobooks are differently abled(Blind) friendly. We strongly believe that, access to knowledge should not be situational, that's why BookSnap is such a platform which is not just user-friendly, free of cost but strongly believes in growing by uplifting everyone with knowledge.

AI powered technologies have a rapid growth in the audiobook industry in the upcoming times, by introducing unique features. This will increase the demand of Audiobook industry and thus leading to high competition where competitors will indulge themselves into adding unique features in order to improve the production process. As of now, we can patiently wait for the new features AI powered technology gets in the audiobook industry.

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MEDICAL-DIAL: An android application for medical emergencies

Lincy V J[1], P V Bhaskar Reddy[2], Monica Patel T[3], Muskan Kesharwani[4], N Raksha[5]

[1] , [3], [4], [5] IV B. Tech, School of Computer Science and Engineering, REVA University, Bengaluru.

Professor, School of Computer Science and Engineering, REVA University, Bengaluru

Abstract.

Medicine wastage is one of the most serious and under-appreciated issues in today's healthcare. One of the major concerns is the wastage of pharmaceuticals that may be utilized for patients in emergency situations because prompt availability of these drugs can save a life. Along with this, alarming medical emergencies where there is a lack of synchronization between the blood donors and hospitals and the blood banks can cost a life. The immediate requirement of blood supply to the spot of requirement is always difficult to arrange. Thus, Medical- Dial is a one-stop solution for this issue. MEDICAL-DIAL is an android application that caters to all kinds of medical emergencies. A community-based blood and medicine donation app built on Android Studio and Firebase Realtime Database. MEDICAL-DIAL is an attempt to ease the process of blood and medical emergencies by connecting blood donors and drug vendors directly with people in need of blood and medicines. MEDICAL-DIAL connects blood donors and drug vendors with recipients, without any intermediary such as blood banks and pharma stores, for an efficient and seamless process.

Keywords. Blood seeking, Medicine Donation, Medicine seeker, Blood donation, Medical News.

1. INTRODUCTION

In today's world there are many problem related to medical facilities and requirement provided. From people not being ableto afford medicines to unable to find matching blood group during emergencies. Our app is built to resolve such issues.

For instance, sometimes customers buy medicine in bulk without taking into consideration their requirements and their validity. In such cases our app MEDICAL-DIAL, helps people who have extra medicines to donate it to the people in need of those medicines before they expire. This prevents wastage of medicines which could have saved a life if provided on time.

Our App also allows people who are willing to donate the bloodto register themselves. In case of medical emergencies where blood is required, using our app the patient can look for the donor belonging to their blood group.

This app allows scanning the image of a medicine to verify the authenticity of its expiry date and strength, as specified by the medicine provider. If either of the values does not match or is unavailable, the user's medicine will be rejected. Our app also provides news about medical inventions, new technology development and other context related to medical fields. To ease the use of this application there is a separate section containing FAQs and helpdesk contact.

2. LITERATURE SURVEY

Healthcare applications (app) have the capacity to improve everyday medical exercise by incorporating proof based healthcare tools. The purpose of this research is to describe the primary features of Android-based healthcare apps on Google Play and to identify the ones which can be proof-based totally. For the purpose of our studies, only the best free apps had been taken into consideration [1][8]. Aside from the overall traits, numerous criteria touching on interactivity, functionality, aesthetics, contents, benefits, and evidence-based totally aspects had been taken under consideration. The use of cellular devices by using fitness care specialists (HCPs) has transformed many factors of medical practice. The use of mobile devices by health care professionals (HCPs) has transformed many aspects of clinical practice [10]. With the rapid growth of technology and increasing number of mobile phones, there is a rapid explosion of creation of medical applications [4].Features such as time management, monitoring of patient information, maintenance of records, consultation, references, assistance for taking clinical decisions, education and training related to medical field are present in many apps to help HCPs with a variety of main tasks[2][7]. There are a variety of benefits of using mobile phones and applications to HCPs. The most prominent ones are improved access to point-of-care tools which ensures that there is better support and improved clinical decisions which leads to better outcomes for patients [6]. Some HCPs, however, remain unwilling to utilize them [3]. In order to ensure effective usage and integration of these increasingly complex technologies into medical practice, improved standards and validation methods for mobile medical apps must be implemented, regardless of the benefits they give [9]. These initiatives will raise the barrier to entry into the medical app market, hence increasing the quality and safety of the apps now offered to HCPs [5].

3. EXISTING APPLICATIONS

A. Teladoc-24/7 access to a doctor:

Teladoc health is committed to creating a personal healthcare experience. They develop technologies to connect to patients. enhance health decisions and outcomes with data.

Disadvantages: Accessible only in US.

B. Generis: DNA & Nutrition:

GENERIS is a health and wellness platform powered by your DNA. It bring together your genes, goals, and lifestyle preferences to help you meet your goals through personalized and actionable plans.

Disadvantage: Not user friendly.

C. Better Help – Online Counselling:

It offers counselling through online messaging, live chat, and video and phone sessions. Better Help offers professional counselling from accredited psychologists, clinical social workers, marriage and family therapists, and board-licensed professional counsellors.

Disadvantages: Not cost effective.

D. MDacne – Custom Acne Treatment:

MDacne is the future of acne treatment. In less than 5 minutes you'll get a complete acne treatment kit personalized based on your unique skin.

Disadvantages: Not cost effective.

E. MySugr – Diabetes Tracker Log:

This app logs the user's data and also gathers information about their everyday remedy like diet, quantity of carbs they take in, medications, glucose and insulin levels. Disadvantages: Not available for free.

F. EyeCare Live:

A telemedicine platform that affords patients a way to connect with licensed eye care professionals at home.

Disadvantages: People prefer visiting hospitals for bettertreatment.

4. PROBLEM DEFINITION

Wastage of medicines that could be of use for patients in critical situations, unable to arrange blood on time, being unaware about medical issues and technologies are some of the problemsfaced in appropriately treating the patients on time.

5. OBJECTIVE

MEDICAL-DIAL connects blood donors and drug vendors with recipients, without any intermediary such as blood banks and pharma stores, for an efficient and seamless process and also donate medicines to people in need and also keeps people updated about trends and development in medical field.

6. PROPOSED SOLUTION

This utility gives six services namely blood donation, blood seeker, medicine seeker, medicine donation, news and FAQs. This application contains a section for blood donation where theuser can fill in details like name, blood group, mobile numberand an evidence record is to be uploaded to affirm their blood group. Blood seeking is a section which consists a list of names of the blood donors together with their mobile number, gmail address and blood group. It also provides a drop-down menu tofilter the blood group as per consumer requirement.

Medicine donation is sub categorized into three sections: request, uploaded and upload. Under the request section it willlist the medicine names that the consumer have requested for. And below the uploaded section it shows the list of medicines that are uploaded by the users along with its name, image, dosage and expiry date of the medicine.

And finally, under the upload section the user is asked to scan the image of the medicine and through image processing technique the name, expiry date and dosage is read by the application. The user has to manually choose the quantity of the medicine that he/she would like to donate from the drop-down list provided. Finally, the user has to check on the check box after agreeing to the terms and conditions. The terms andconditions stated are that the MEDICAL-DIAL application shall not be held accountable: If the services provided are not taken without any advice of a medical professional. If the user faces unforeseeable side effects of during their medication, thatmay or may not be hazardous. If the user shall provide incorrectmedical data either due to medical negligence or any type of malpractice follows. It also highlights a note that states only upon agreeing to the terms and conditions, can a user register their donated medicines. Medicine Seeker consists a list of medicines along with their image, name, quantity and expiry date. The user can scroll through the list and pick the medicinethat is needed.

News section provides valuable news in the medical field suchas the discovery of a drug or discovery of a virus. This section never fails to keep the person updated in the medical field.

FAQs focuses on the myths and facts. It provides a list of mythsand facts helping users to overcome superstitious thoughts andbe self-educated.

7. BLOCK DIAGRAM

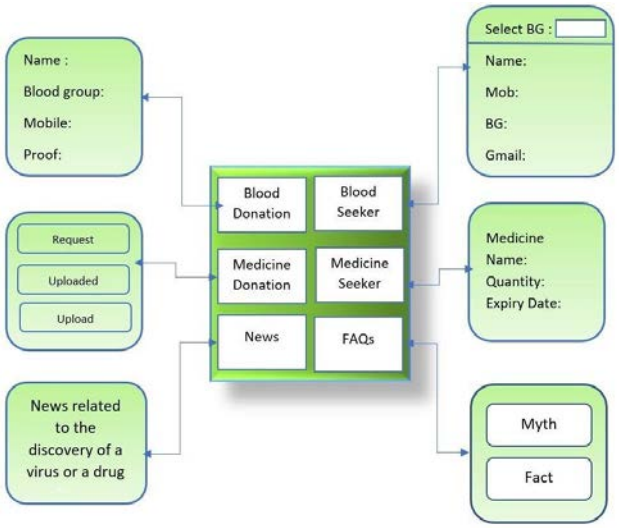

Fig1. Medical-Dial block diagram

8. WORKING

The app's welcome screen, which displays the app logo and a background for 2 seconds before moving on to the next activity. To be eligible to use the app, the user must first register, and then verify his email address before logging in to the app.

After logging into the app, it will first ask for the services they are looking for such as blood donation, blood-seeking, medicine donation, medicine seeking, news, or facts. Users canselect the appropriate services based on their needs from the presented home page. On the Home page`s Menu tab, users can see and edit their profile. This app service provides the most recent health and life news, which is updated every three hours.

The user can request medicine from the medicine donor and also view the medicine's details. The user can go to home page`s Menu tab and go to “Medicine Donation” section to share any leftover or unused medications here. They can upload a photo of it along with the expiry date and dosage strength (mg). Using image processing concepts, we can determine whether or not the medicine is genuine, i.e., whether or not it has an expiry date.

9. RESULTS

The user-interface of MEDICAL-DIAL application is shown below:

Fig2. Welcome page

Fig3. Registration page

Fig4. Left panel view

Fig5. Section view

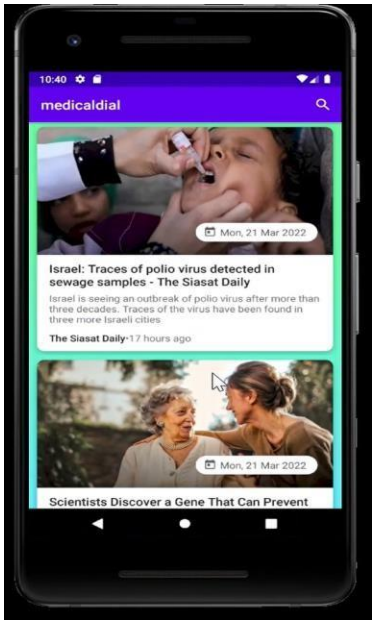

Fig6. News section

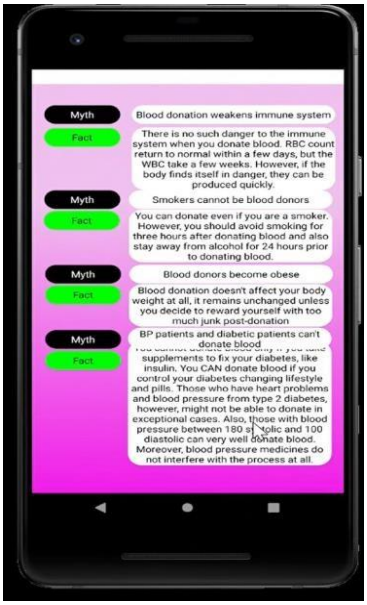

Fig7. Myths and Facts

10. CONCLUSION

MEDICAL-DIAL is an application that is used during an emergency to obtain services such as blood donation, blood seeking, medicine donation, medicine seeking, news, or facts. MEDICAL-DIAL connects blood donors and medicine suppliers with receivers without the need of intermediaries such as blood banks and pharma shops. MEDICAL-DIAL is an attempt to make the procedure of blood and medical crises easier by linking blood donors and medicine suppliers with those who need blood and medicines immediately. MEDICAL- DIAL also gives information such as medical inventions, new technological development, and other medical-related topics.

Some of the advantages of using MEDICAL-DIAL are its easy to use, it's a one-stop solution for all medical emergency situations, there is no involvement of a third party in thisprocess which ensures that medical and blood donation processhappens in a hassle-free manner and also provides knowledge about the latest trends and technologies in the medical field. For the purpose of our project, we have developed a prototype module. In future, this project can be taken to the product level. This application is user friendly. Going further, this application can be the first choice for the users to use during medical emergencies

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Biographies

AAS- Automated Alert System for Driver Drowsiness

Prem P, Pruthvi Nandan DH, SR Sagar, S Rohan, MadhumitaMishra
School of Computer Science and Engineering
REVA University, Bangalore, India

***Abstract*- Drowsiness in a driver is one of the major reasons behind the increase in accident rates. The eyes, an important sense organ of the body, deliver the most information. When an operator is weary, facial expressions such as blinking, yawning rate, and face tilt change from those in a normal state. We propose an efficient alert system for drivers-drowsiness in this effort, we employ video clips to monitor drivers' tiredness status, such as eyes closure duration, yawning, and head tilt position, without having them carry sensors on their bodies. Due to the limitations of previous methodologies, we are using an efficient face-tracking algorithm to improve tracking reliability. To distinguish facial areas, we used a technique based on 68 key points. Then we assess the passengers' health using these areas of the head. By integrating the eyes, mouth, and head, the AAS raises a fatigue alarm alert to the driver.**

Keywords— Drowsy driver, The yawn rate, eye closure length, fatigue alert

1. INTRODUCTION

An automobile is now a necessary form of mobility for most people. As per statistics published by: "Statista Research Department", sales of cars worldwide grew by approximately 3 million units in 2021 as compared to the previous year's sales. Although the use of automobiles like cars, bikes, etc. has altered people's living standards and made day-to-day work so much easy as well as convenient, sadly it is linked to several negativity like road accidents which leads to loss of precious lives & hard-earned money. According to the National Highway Traffic Safety Administration (NHTSA) published data, a total of 72,77,000 road accidents were reported in 2016, with a total of "37,461" precious lives lost and a total of 31,44,000 people injured. Driver driving when they're not fully fresh or are in the Fatigued stage was one of the main reasons responsible for mostly 20% to 30% of the traffic accidents in this research. Thus, driving a vehicle in a fatigued state is a major important risk in traffic causality. The drowsiness-driving-detection technology in the modern world has now become a prominent research area.

Positivist and analytic detection methods are two types of detection procedures. A driver must engage in the subjective recognition method's analysis, that connects to the driver's personalized impressions through procedures such as self- observation, assessment, and filling out an opinion poll. Then, these data help the drivers to pre-plan their work timings based on the data. The objective detection method does not need drivers' feedback because it examines the driver's state of mind and driving-behaviour parameters in actual time. The data is being gathered to find out the level of drowsiness drivers have. In addition, objective detection is divided into 2 different categories: contact and non-contact. Non-contact is cheap and much more suitable than that contact because the method does not need Vision-based technology or a high-level camera, which allows more cars to use the gadget.

The non-contact approach has popularly been applied in fatigue-driving detection because it is easy to install and doesn't cost much. Concentration Technology and Smart Eye, for example, use the motion of the eyes of the driver and the head position of the driver to estimate their fatigue level. The use of the alerting system has made our technique much more unique and future-proof.

EXISTING SYSTEM

In the existing system, distraction can be indicated by changes in eye-steering correlation. Eye movements linked with road examining procedures have a low eye steering connection, which can be shown by autocorrelation and cross- correlation of horizontal eye state and the angle of the steering wheel. On a straight road, the eye steering correlation will regulate the connection. Because of the straight route, the steering motion and eye glances had a low association. This system's goal is to identify driver distraction depending on visual behaviour or conduct; thus, it's used to describe the relationship between vehicle control and visual behaviour for that purpose. This approach assesses the eye-steering association on a normal road, assuming that it shall have a comparative and empirically

different connection than a curving road and that it will be susceptible to distraction. On curving roads, a high eye steering connection linked with this process has been discovered in the visual behaviour and vehicle control relationship, which reveals a basic perception- control mechanism that plays a major role in driving.

In technology like computer vision, recognizing objects and tracking is one of the important issues. Human-computer interaction, the nature of a person's recognition, robotics, and monitoring are just a few of the domains where it can be used. The pixel connection between adjacent frames of the video sequence and movement changes of the pixels, according to Lucas, you can use pixel connections between adjacent frames in a video sample and changes in pixel movement to monitor moving targets. This technique, on the other hand, can only recognize a moderate-sized target that moves in between the frames. Based on recent developments in the correlations filter in CV (Computer vision), Bolme introduced the Minimal Outcome Sum of Squared Error (MOSSE) filter, which may give robust correlation filters for tracking the objects. Despite its high processing efficiency, the MOSSE's algorithm accuracy is restricted, and it studies grey info from one phase [1].In computer vision, tracking visual objects is a key topic. It can be applied in a variety of fields, including behaviour identification, human-computer interlink, robotics, and supervision Visual-based surveillance calculates each frame of the image at the target location based on the early state target of the preceding frame. According to Lucas, the relationship in the pixel between each subsequent frame of a video series can be used to track a moving target. On the other hand, this approach can only detect a moderate target that travels across two frames. [3].

OBJECTIVES

The driver's eye is tracked using a real-time eye-tracking system. When a motorist is tired or preoccupied, he or she has a slower reaction time in different driving circumstances. As a result, the chances of an accident will increase. There are three ways to identify tiredness in a driver. One of the major criteria is physiological changes in the body, which can be pulse rate, cardiac activity, and brain messages, which a wearable wristband system can detect. The suggested eye-tracking system achieves the second method through behavioural metrics such as unexpected nodding, eye movements, yawning, and blinking.

The developed system's goal is to achieve the following five primary points:

A-Affordable: The technologies must be affordable, as the cost is one of the most important considerations during the design phase.

Portable: Solution to be mobile and easy to put in place in any kind of vehicle model.

Secure: The system should be secure by ensuring that components are in a safe area.

Quick: Because an accident occurs in a matter of seconds, the reaction and process time to react in the event of a driver's urgency is among the most important variables.

Accurate: Because the system must be precise, we have chosen the most precise among them.

METHODOLOGY

one of the most important reasons for road accidents in the real world has a solution now. The system is one step towards safeguarding precious lives by avoiding accidents in the real world. The proposed system is based on DLIB & SOLVE PNP Models.

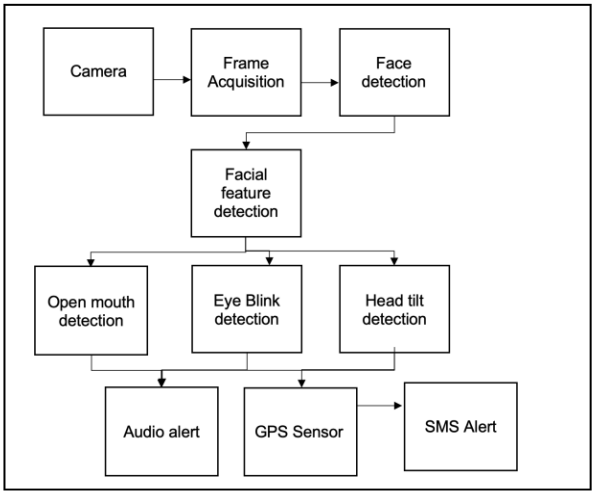

Fig.1 Block Diagram of Proposed System

The camera is initialized at the beginning; frame acquisition is done in the next step by using image classification and object detection. Object detection not only predicts the object (Face) but also finds there location in terms of bounding boxes. After the Frame is acquired, the face is detected in the frame representing bounding boxes. In the next step, we detect facial features, and the eye position, mouth & head is identified by using 68 face point co-ordinates.

Following are the formulae to calculate Eye Aspect Ratio:

$$\mathbf{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

Following are the formulae to calculate Mouth Aspect Ratio:

$$\mathbf{MAR} = \frac{\|p_2 - p_8\| + \|p_3 - p_7\| + \|p_4 - p_6\|}{2\,\|p_1 - p_5\|}$$

We calculate the head Position using PnP i.e. Perspective-end- Point by detecting 3D facial points:

a. The Nose Tip: (0.0, 0.0, 0.0)

b. The Jaw: (0.0, -330.0, -65.0)

The left eye's left corner: (-225.0f, 170.0f, -135.0)

The right eye's right corner: (225.0, 170.0, -135.0)

e. The Mouth's left corner: (-150.0, -150.0, -125.0)

f. The Mouth's right corner: (150.0, -150.0, -125.0)

After calculating EAR, MAR & PnP, the system alerts through the speaker if it detects eyes closed for more than 5 secs and measure system also sends an SMS alert to the concerned person including GPS location fetched via GPS sensor.

IMPLEMENTATION

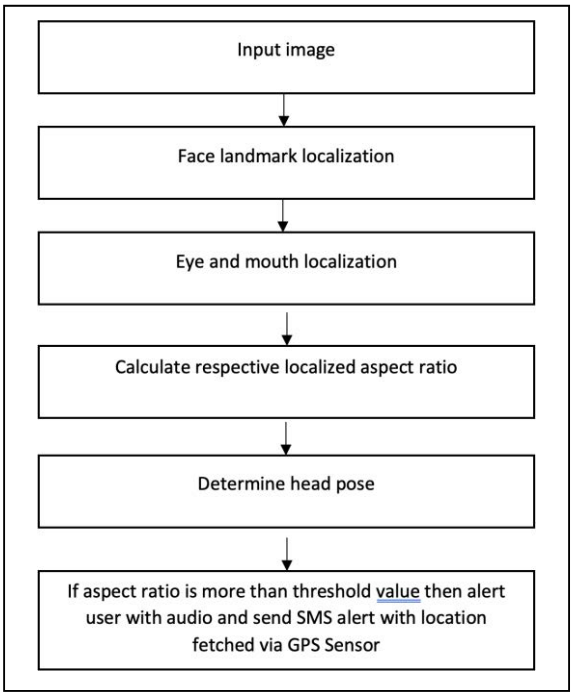

Fig.2 Implementation of the Proposed System

A facial marker is being used to pick out and represent the main facial aspect, such as:

Eye

Eyebrows

Nose

Mouth

Jawline

Alignment of the face, estimation of the head pose, switching

Face prediction problem is a subclass of face landmark detection. In the Given input image, a shape predictor tries to identify significant spots along with a shape of an image. In the field of facial landmarks, we want to employ a shape prediction method for finding important facial structures only by looking at them. Finding facial signs is only two stages:

Step #1: Identify the face.

Step #2: Identify the key facial points on the face Region of interest.

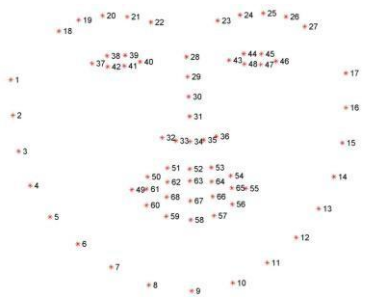

Fig.4 Picture representing the 68 face point coordinates from the iBUG 300- W dataset are visualized.

EYE ASPECT RATIO

Each eye is represented by six (x, y) coordinates that start in the left corner and rotate clockwise around the rest of the area. Eye aspect ratio is a scalar quantity obtained by detecting a face from an image, finding the Euclidean distance of the corresponding eyecoordinates. f the face, detecting blink, and other jobs have all been constructively completed using facial landmarks.

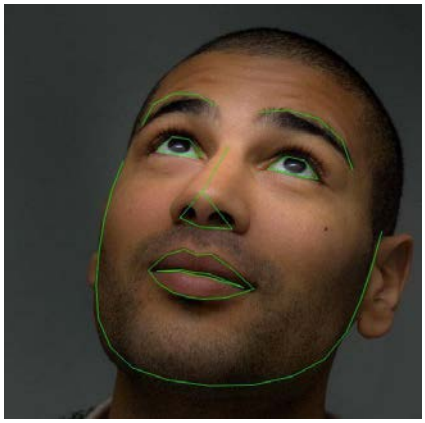

Fig.3 In this image, we used facial landmarks to name and identify essential face features.

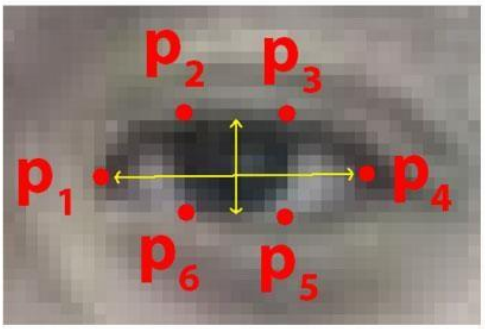

Fig.5 6 facial landmarks related to the eye.

MOUTH ASPECT RATIO

Mouth aspect ratio is a measure to find how wide open the mouth is extended from driver-drowsiness system that detects the yawns.

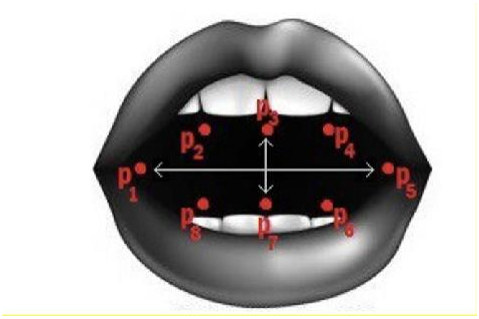

Fig.6 Facial Landmark associated with Mouth

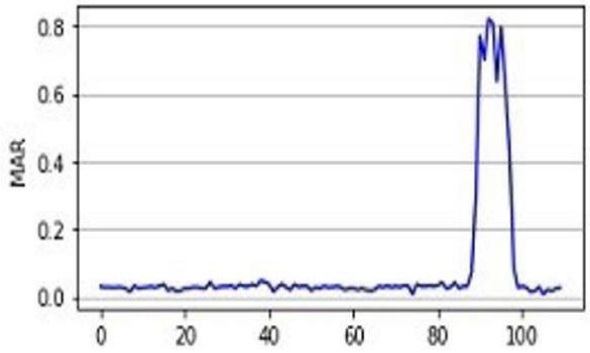

Fig.7 Graphical Representation of yawning

yaw[z]), It is used to express a rotation matrix (3*3), or a rotation direction (axis) and the angle can is used to express it.

VI OUTCOMES

The graph clearly shows that whenever the mouth is closed, the mouth aspect ratio is nearly zero, as in the first 80 frames. The mouth aspect ratio is higher somewhat when the mouth is partly open. However, inform frame 80, the mouth aspect ratio is much higher, indicating that the mouth is completely open, most likely for yawning.

PnP (For Head Tilt Detection)

In computer vision, an object's pose refers to its inclination and location about the camera. You can alter the attitude by shifting the article about the camera or the camera about the item.

A 3D rigid item only has two types of motions regarding a camera.

Translation: Translation is the process of shifting the lens from its present 3 Dimension (X, Y, Z) location to a new 3 Dimension location (X, Y, Z). As you can see, translation has three free points. They can be moved in the X, Y, or Z directions. It is denoted by a vector t which is similar to:

$$(X' - X, Y' - Y, Z' - Z)$$

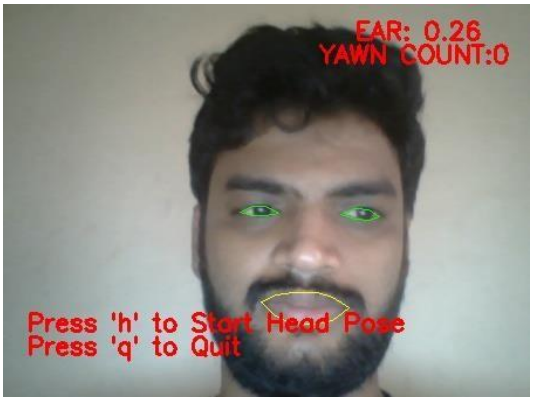

Fig.7 Real-time view through the camera

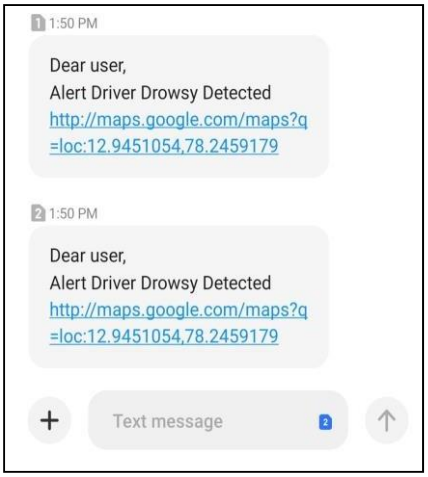

Fig.8 SMS Alert to Concerned Person

5 CONCLUSION

A framework that spreads and monitors the driver's eye Aspect Ratio, mouth Aspect Ratio and head movements is Rotation: The camera can also be rotated around the X, Y, and Z-axis. As a result, there are three rotations in degrees of freedom. Rotation is represented in different ways. Euler angles (roll[x], pitch[y],

designed to detect weariness. The framework utilizes a mixture of layout-based coordinating and highlight-based coordinating to keep the eyes from wandering too far. The framework will certainly determine if the driver's eyes are closed or open and whether he is looking ahead while driving.

A notice indication will be given as a bell or alarm message when the eyes are closed for an extended period. GPS will detect the live location and update. Whenever eyes are closed, continue yawning and the head is tilted will trigger the system to send an SMS alert to provided number ensuring the safety of the driver, people walking on the road, and other fellow drivers.

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Finally, we wish to express our deep gratitude to our parents for their constant words of encouragement throughout our studies.

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ANALYTICS OF BEHAVIOURAL HEALTH CONDITIONS USING MACHINE LEARNING AND DEEP LEARNING

[1]Wilona Maria Furtado, [2]Shantala Devi Patil

School of Computer Science and Engineering, *REVA University*
[1]wilonafurtado2@gmail.com, [2]shantaladevi.patil@reva.edu.in

Abstract.

In this paper, we have collected thebehavioural health conditions dataset of normal and depressive comments on which NLP techniques like tokenization, lemmatization are applied on text to get clean text using the NLTK toolkit. The words with most frequency are visualized through word cloud matplotlib package. The dataset is balanced using oversampling technique on which TF-IDF is applied. Machine learning techniques like Random Forest classifier, XG Boosting and deep learning techniques like ANN are implemented where Confusion matrix, Accuracy, F1-Score and ROC are used to view the performance of the model. The model will be deployed using FLASK python where a user will enter their condition in the form of text where the model will detect and suggest if the person is normal or suffering from depression and needs to visit a counsellor. Theperformance of the modelswas analysed using accuracy and error.Random Forest Classifier model has accuracy of 99.83% which is better compared to XG Boosting and ANN.

Keywords. Tokenization, Lemmatization, Oversampling, TF-IDF, Random Forest Classifier, XG Boosting, ANN, Confusion Matrix, Accuracy, F1 score, precision, recall, classification report, FLASK python

1. INTRODUCTION

Mental illness, usually referred to as mental health diseases, is a condition that affects one's mood, though process, and the way they behave. Mental illnesses include depression, anxiety and eating disorders, addiction and schizophrenia.A mental health condition becomes a mental illness when unattended symptoms create stress and hamper one's ability

to function.Mental illness can make you feel awful, causing problems at home, at work, and in your relationships.Medication and counselling might be used to treat symptoms.

Feeling depressed, having trouble concentrating, having intense emotions of guilt, having dramatic mood fluctuations, withdrawing from friends and hobbies, and having suicidal thoughts are all signs and symptoms of mental illness. Inherited features, prenatal exposure to the environment, and brain chemistry are all potential causes of mental illness.The risk factors of mental illness are a history of mental illness in a blood relative, tough situations in life, chronic medical condition, childhood history of abuse, use of alcohol or recreational drugs and previous mental illness.Mental illness can be prevented by paying attention to warning signs, go for regular checkups for medical care and top it all by taking good care of oneself.

It is quite a debatable topic to come to a conclusion if a person is suffering from depression or not. Hence, we train the model with the behavioural health conditions dataset by using ML and DL techniques. The model will help in predicting if the person is normal or suffering from depression. This will help the person to go and get some help at the earliest leading to reduction of suicidal cases.

The following is the layout of the paper. The literature survey is discussed in Section II. NLP, ML, and DL approaches employed in the paper are discussed in Section III. Section IV presents the proposed work. In Section V, you'll see the results. Section VI concludes with a discussion of the future scope.

2. LITERATURE REVIEW

Anamika Ahmed et al. [1] developed a model that integrated traditional psychological tests with machine learning algorithms to detect the severity of mental illnesses at various levels.Two datasets, anxiety and depression, were used to test CNN, SVM, LDA, K-NN Classifier and Linear Regression. The CNN algorithm was used to achieve accuracy of 96% for anxiety and 96.8% for depression.Data is processed by Rahul Katarya et al., [2] to uncover the features that influence employee mental health which could be personal or professional. To discover the model with the highest accuracy, ML techniques such as SVM, KNN, Regression, DecisionTree and Random Forest are used. Decision tree classifier had the best performance with 84% and 83 precision whereas KNN had the worst.MS. Purude Vaishali Narayanrao et al., [3] used questionnaires, social media posts, verbal communication text, and facial expressions to collect data. Students in high school, college and working professionals were the target categories for identification with the findings indicating whether or not the person need assistance. Machine learning algorithms and classifiers such as Decision Tree, SVM, Naïve Bayes Classifier, Logistic Regression, and KNN Classifier are used to detect the mental state in a targeted group. Using the Twitter scraping tool Twint, the tweet is classified as depressive or not.Yara E. Alharahsheh et al. [4] employed a strong, reliable supervised ML classifier with the best performance to predict whether or not a person in Kenya is likely to suffer from depression. SVM, Random Forest, Ada Boosting, and voting ensemble methods had the

greatest f1-score 0.78 and 85% accuracy while Naïve Bayes, Logistic Regression, Decision Tree, Gradient Boosting, Bagging, XGBoost, and Stack methods were also applied.Nur E Jannat Asha et al., [5] have developed a low-cost heart rate monitoring system based on sensors and IoT devices. The sensor will be attached to the finger and the colour variation will be chosen when the interval is monitored. The signal is processed using an Arduino microcontroller and devices are used to track blood. CSV files are used to store the Arduino-measured heart rate data. Heart rates are recorded and emotions are classified as positive, negative, or neutral using the Geneva affective picture database. SVM with polynomial kernel, a machine learning method, is used to predict mental stress from heart rate data exhibiting the best accuracy.

Using machine learning, Carlos Alfonso V. Palattao et al. [6] discovered factors leading to stress, depression, and anxiety in the Philippines population. To measure mental health, the data from 2119 participants who responded to an online survey was analysed using feature selection methods and ML classifiers such as Random Forest, Naïve Bayes, SVM and Logistic Regression.Data from electronic health records was used to create a tagged list of words relevant to the disease matched against symptoms of psychological disorders for prediction by YamuAryal et al., [7]. The output of machine learning models is compared to the prediction of psychological disorder based on fMRI and PET images collected from the patient's EHR. In order to process complicated mental health data, artificial neural networks and machine learning are used.V. Uday Kumar et al., [8] collected data from working people and asked them a variety of questions in order to determine despondency. In comparison to SVM and Decision Tree, the dataset is passed through ML algorithms, with Random Forest providing the highest accuracy of 87.02%.ML and DL techniques were used by Pramod Bobade et al., [9], to detect stress in individuals using a multimodal dataset collected from wearable psychological and motion sensors in order to prevent stress-related health problems. Sensor data such as ACC, BVP, ECG, TEMP, RESP, EDA and EMG are utilised to determine three psychological states: amusement, neutral and stress. Machine learning algorithms such as K-NN, LDA, Random Forest, Decision Tree, AdaBoost, and Kernel Support Vector Machine were used to evaluate and compare the accuracies of all three classes and binary classification. The accuracies for three class and binary classification were 81.65% and 93.20%, respectively. The results for the simple feed forward deep learning artificial neural network were 84.32% and 95.21%, respectively.Sangeeta R.Kamite et al., [10] where a system capable of analysing syntactical markers related to onset and perpetual symptoms of depression was developed. Algorithm was developed to help in prediction of depression in an effective manner with an approach that syntactical markers used in tweets were used to frame statistical model in depression prediction. Random forest achieved 99.89% accuracy.

Payel Bhattacharjee et al., [11] where sedentary, sleep or rest behaviour of healthy adult with aid of physical activity was analysed. A relation is obtained between parameters affecting sleep and sedentary behaviour with the physiological signals obtained from commercial wearable devices. The techniques employed for analysis were random forest, XGBoost, SVM, and K-NN.Apple watch and Fitbit are the commercial wearables used for data analysis. XGBoost provides best accuracy.Kuhaneswaran A/L Govindasamy et al.,

[12] where the users depression was detected using their social media data. The sentiment score was determined using sentiment analysis, which classified it as positive, negative, or neutral. Labeled tweets were fed into ML algorithms, with Naïve Bayes and a hybrid mode, NBTree, both providing 97.31% accuracy.Tahmid Hasan Sakib et al., [13] where a person's tweet is analysed whether it has suicidal intention or not using machine learning. Various sets of word embedding and tweet features were used along with comparison with models like Voting Classifier, CatBoost Classifier, XGBoost Classifier, Gradient Boosting Classifier, Logistic Regression, Bagging Classifier, Multi-layer Perceptron, Decision Tree Classifier, SVM, AdaBoost Classifier, K-Nearest Neighbor and Naïve Bayes Classifier.Shivangi Yadav et al., [14], used a routine survey in which people were asked about their home and work situations, as well as their family history of mental illness.K-NN, Decision Tree, Multinomial Logistic Regression, Random Forest Classifier, Bagging, Boosting, and Stacking were among the algorithms employed to predict depression in humans. Best performance was by Boosting with 81.75% accuracy.Faisal Muhammad Shah et al., [15], suggested a hybrid algorithm to detect depression using textual posts from users. The reddit dataset was used to train and test DL models. Bidirectional Long Short Term Memory (BiLSTM) was proposed, along with a variety of word embedding algorithms and metadata elements.Word2VecEmbed+Meta features performed well.

In all the above research papers, they have not deployedall these models for any user use in a simple way by creating a user interface to capture a comment from the user about their state of mind.The comparison between the base paper [1] and this paper is that the base paper made use ofalgorithms like CNN, SVM, LDA, K-NN Classifier and Linear Regressionand achieved highest accuracy of 96% and 96.8% on dataset of anxiety and depression respectively using CNN. This paper made use of techniques like tokenization, lemmatization, oversampling, TF-IDF, Random Forest, XG Boosting, ANN and finally deployed using FLASK python to provide a GUI for the end users and the highest accuracy achieved is 99.83% using Random Forest.

3. NATURAL LANGUAGE PROCESSING, MACHINE LEARNING AND DEEP LEARNING TECHNIQUES

NLP techniques help machines to understand the language humans communicate in by breaking it down. Machine learning methods are used to train the model and perform prediction on unseen data. Ensemble methods aid in learning from multiple weak models and take a decision on the output. Bagging makes use of parallel learning while boosting uses sequential learning. Deep learning algorithms imitate the structure of the human brain and functionalities in the aim to make machines intelligent enough to do complicated tasks.

A. Tokenization

Tokenization is a technique for breaking down large amounts of text into small chunks such as words or sentences called as tokens.Tokens aid in the comprehension of context or the development of an NLP model.By analysing the word sequence, tokenization aids in determining the meaning of the text. The commonalgorithm used for tokenization is Word Tokenization where a piece of text is separated into individual words.

B. Lemmatization
Lemmatization is a stemming-like technique that gives context to words by associating words that have similar meanings to one another.Lemmatization is the process of getting rid of inflectional endings from a word and returning it to its base form known as lemma by making use of vocabulary and morphological analysis.

C. Tf-idf
Term frequency-inverse document frequency, a text vectorizer which convertstext into a vector that may be used. The frequency of each word present in the document is indicated by Term Frequency (TF) while the relevance of the word in the document is indicated by Inverse Document Frequency (IDF).

D. Oversampling
Random oversampling is the most basic form of oversampling method used to balance an imbalanced dataset. The minority class samples are duplicated in order to balance the data. Although this method does not result in loss of data, the dataset is prone to overfitting due to the repetition of the same information.

E. Random Forest
Random forest takes a combination of multiple decision tree models and does the classification based on majority votes of prediction and predicts the final output. This method is also known as bootstrapping where the number of rows and columns from the dataset can be chosen.

F. XG Boosting (Extreme Gradient Boosting)
Gradient Boosted Decision Trees are implemented in XGBoost. In XGBoost, decision trees are built sequentially with weights playing a significant role. All independent variables are given weights which are then fed into decision trees to predict results. The weight of variables that the tree predicts incorrectly is increased and fed to the following decision tree. Individual classifiers are then combined to produce a more accurate model.

G. ANN (ArtificialNeutral Network)
ANN borrows the concept from a biological neural network. To facilitate communication between units, there is a large collection of units connected to the pattern. Units are called nodes or neurons which act as simple processors that operate in parallel. Each neuron is associated with a weight and is connected to another neuron by a link that conveys the input signal information. An activation signal is an internal state that each neuron has.The output signal is formed by combining the input signal supplied to other units with the activation rule.

4. PROPOSED WORK

As shown in Fig.6, we take the behavioural health conditions dataset having a message and label on which we apply tokenization, lemmatization to get clean text. This imbalanced dataset is balanced using oversampling technique followed by TF-IDF. 75% data is used for training while 25% data is used for testing. Model is trained for machine learning

algorithms like Random Forest Classifier, XG Boosting and deep learning methods like ANN. Using confusion matrix, accuracy, f1-score, ROC curve we view the performance of the model. A web application is developed using FLASK python to provide a graphical user interface to the user to enter their comment and the system will state if it's a normal or depressive comment by giving the input to the model on server side. Hence stating if they are required to pay a visit to the counsellor / psychiatrist or not.

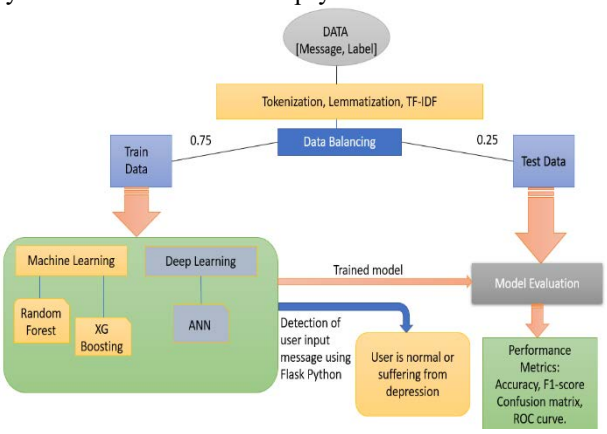


Fig.1. Flow Chart of Proposed Model

5. IMPLEMENTATION AND RESULTS

IMPLEMENTATION:

The behavioural health conditions dataset was used. Using Jupyter Notebook we imported all the necessary packages like pandas, numpy, matplotlib and seaborn. We read the csv file and performed necessary operations. Data is explored using seaborn where we plot the count of target variable using countplot(). If label==0 then it's a normal comment else if label==1 it's a depressive comment. Plot WordCloud after removing stopwords for each normal and depressive comments. Import re, nltk, stopwords, string and WordNetLemmatizer packages to perform NLP techniques. A function process_text() is defined where urls, mentions and punctuation marks are removed and finally we apply lemmatization on the clean words. RandomOverSampler, Counter and TfidfVectorizer packagesare used to balance data using Over Sampling technique on which we apply Tf-idf to clean text. The train_test_split package divides data into train and test segments, with 75% of the data used to train the model and 25% used to test it. Machine learning techniques like Random Forest and XG Boosting and deep learning techniques like ANN are used to train the model and predict test data by importing RandomForestClassifier, XGBClassifier, Sequential and layers packages.Performance is evaluated using confusion_matrix, ConfusionMatrixDisplay, classification_report, accuracy_score and roc_curve packages. Best model is saved by importing pickle package. The model is deployed using FLASK python by importing Flask, render_template and request packages to create a graphical user interface for the user to enter their comment to test if the comment is normal or depressive.

RESULTS:

	message	label
0	just had a real good moment. i missssssssss hi...	0
1	is reading manga http://plurk.com/p/mzp1e	0
2	@comeagainjen http://twitpic.com/2y2lx - http:...	0
3	@lapcat Need to send 'em to my accountant tomo...	0
4	ADD ME ON MYSPACE!!! myspace.com/LookThunder	0
...	...	...
10303	Many sufferers of depression aren't sad; they ...	1
10304	No Depression by G Herbo is my mood from now o...	1
10305	What do you do when depression succumbs the br...	1
10306	Ketamine Nasal Spray Shows Promise Against Dep...	1
10307	dont mistake a bad day with depression! everyo...	1

Fig.2. Data in the Dataset

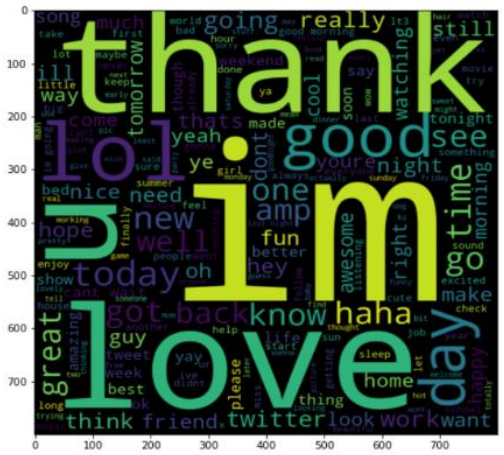


Fig.3. Words frequency in Normal Comments

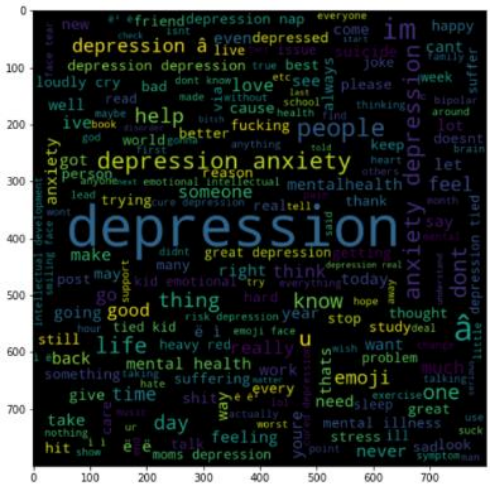


Fig.4. Words frequency in Depressive Comments

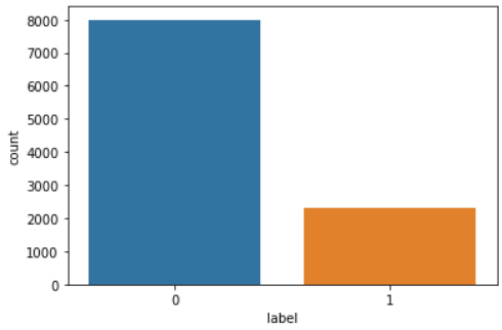


Fig.5. Illustration of a count plot of label column

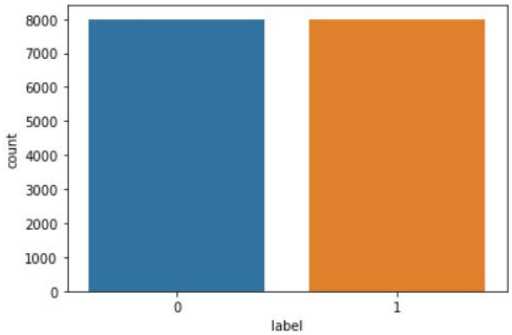
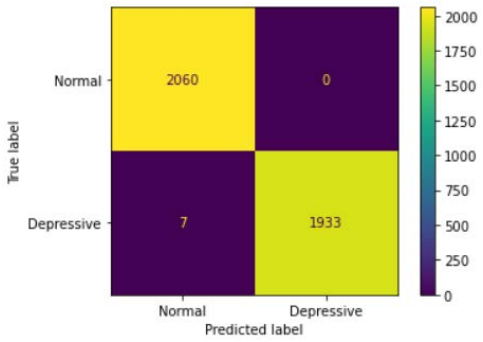


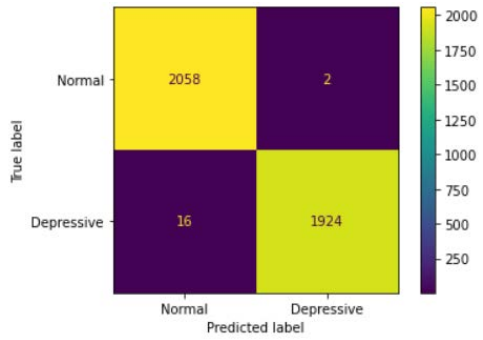
Fig.6. Balanced Data



	precision	recall	f1-score	support
0	1.00	1.00	1.00	2060
1	1.00	1.00	1.00	1940
accuracy			1.00	4000
macro avg	1.00	1.00	1.00	4000
weighted avg	1.00	1.00	1.00	4000

Accuracy: 99.83%

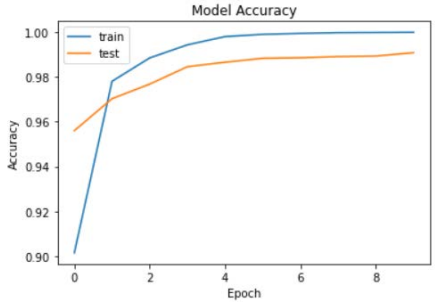
Fig.7. Random Forest Classifier

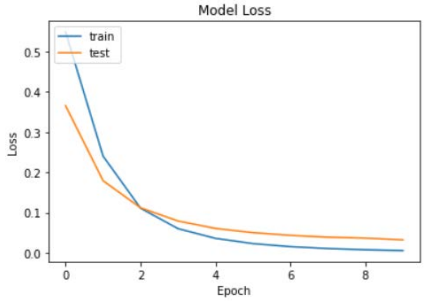


	precision	recall	f1-score	support
0	0.99	1.00	1.00	2060
1	1.00	0.99	1.00	1940
accuracy			1.00	4000
macro avg	1.00	1.00	1.00	4000
weighted avg	1.00	1.00	1.00	4000

Accuracy: 99.55%

Fig.8. XG Boosting





Testing Accuracy: 99.0750

Fig.9. ANN

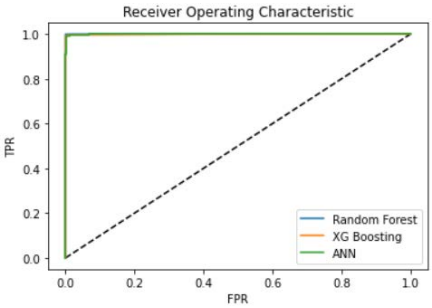


Fig.10. ROC Curve

Fig.11. User enters a Depressive comment

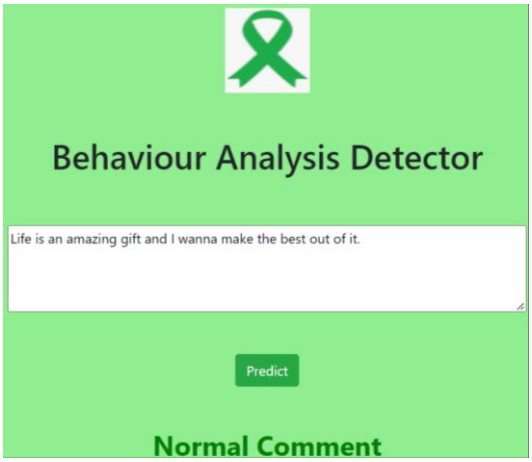


Fig.12. User enters a Normal comment

6. CONCLUSION& FUTURE SCOPE

Behavioural health conditions affect a person's mood, thinking which causes Depression, Anxiety, etc. By using some machine learning and deep learning approaches aids in improved model training. The dataset considered has normal and depressive comments. NLP techniques like tokenization and lemmatization are applied on text to get clean text. The dataset is balanced using oversampling technique on which we apply TF-IDF. Random Forest Classifier gave the best accuracy. Finally, the model is deployed using FLASK python for the user to easily interact with this system. This recommendation system will suggest to the person if they are normal or suffering from depression and need to visit a counsellor / psychiatrist which helps in early detection of behavioural health conditions reducing drastic steps like suicide.

In future work,the dataset could be created through surveys taken from people of diverse backgrounds. This system could be linked with counsellors such that if the person shows signs of depression, then the counsellor will get alerted and can contact the patient.

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BLOCKCHAIN BASED APPROACH FOR SECURING HEALTH CARE DATA

Roshini R
Computer Science Engineering
Reva University
rroshini3@gmail.com
Dr. Farooque Azam
Associate Professor, Computer Science Engineering
Farooque.azam@reva.edu.in
Ramya Bhat
Computer Science Engineering
Reva University
ramyabhat325@gmail.com
S Anusha
Computer Science Engineering
Reva University
sanusha12720@gmail.com
Ramya M
Computer Science Engineering
Reva University
ramyamanjunath5878@gmail.com

Abstract

For a long time, Blockchain has been an exciting research topic, and many firms have benefited from its benefits. Likewise, Blockchain technology offers a lot of potential in the healthcare sector because of privacy, confidentiality, decentralization and security, Nonetheless, Electronic Health Record (EHR) systems are plagued by worries about data security, integrity, privacy and administration. We address how Blockchain technology may be utilized to improve EHR systems and how it could be a solution to these problems in this paper. We present a patient centric approach for integrating Blockchain technology for electronic health records in the healthcare sector. Also, to offer secure storage of electronic records for users of the proposed framework by specifying granular access controls. This framework gives the EHR system the advantages of a Scalable, secure, and integrated blockchain-based system.

Keywords – Blockchain, Decentralization, EHR, Patient Centric, Privacy, Security.

I. INTRODUCTION

The development of technology these days is influencing every aspect of fast-changing human life, as well as the way we previously used and interpreted things. As technology changes, it can also be found in various other areas of life. The essential blessings that development in era is supplying are to enhance protection, person enjoy and different factors of healthcare sector. We are residing in a generation wherein we're producing fitness information at an unparalleled price and storing this information on paper is technically impossible. This brought about the creation of Electronic Health Records (EHRs) withinside the last few years. However, its blessings have by no means been nicely used by healthcare carriers because of loss of protection and interoperability. The information saved in hospitals and different associated company is liable to diverse protection threats along with unmarried factor of failure and traditional DDos attacks. Furthermore, it is unnecessary to store the same patient's records in several institutions when a single database may be used [1].

Electronic Health Records (EHRs) are located in multiple hospitals and administered by centralised cloud providers in current healthcare systems. However, it creates a point of failure because patients, the genuine owners of their EHRs, lose track of them. [6].

The most critical matter of the day is a comprehensive solution which is dependable, secure, confidentiality-preserving, and economical cloud storage that can withstand the turbulence of the fast developing digital storage technologies.

[7]. One of the factors of our motivation is security, another is obtaining relevant data out of patient's large medical record in less time. They do, however, have worries about medical information privacy and security, user data ownership, data veracity, and other issues. The comparison and analysis of the systems reveal a significant disparity, which is due to a lack of scalability [8]. Implementing a revolutionary technology like Blockchain might be the solution to these issues. This invention promises to make always maintaining healthcare records and other health-related information a breeze. The main goal is to create temper-proof, secure medical records that can be shared over multiple platforms. In other words, Blockchain technology allows transactions to be completed without the involvement of any third party. [14].

Hence, the major purpose of our proposed system is to establish a framework based on Blockchain for Electronic Health System which protects the integrity and security of the data. The rest of the paper is organised as follows. Related work is described in Section II. Section III describes the architecture. Our methodology is detailed in Section IV. The end result is Section V. Finally, this article is concluded, and future work is given in Section VI.

II. RELATED WORK

In [1], IPFS's off-chain scaling method is used to construct a Blockchain-based DApp using the Solidity programming language to provide secure record storage and precise record access controls for those records. This framework facilitates Improved Scalability, Content-Addressability, Integrity, Access Control, and Information Confidentiality. IPFS, on the other hand, uses transport - encryption rather than content encryption (which implies that data is protected when being transferred from one IPFS node to another, but

anyone with the Content Identifier can download and see it) (CID). which is not much appreciable when privacy of data is concerned.

In [2], a Blockchain-based architecture is developed using Hyperledger Fabric supported by Java. While the incentive mechanism is implemented to build new blocks, On the Blockchain, smart contracts provide auditing and access control of Electronic Health Records. Ensures Integrity of the data, improves interoperability the systems. Along with SHA-256, Shamir's Secret Sharing Algorithm is used for access control.

In [3], The Hyperledger Fabric framework is used to implement a Blockchain-based approach to data access management. It comprises both of public and private Blockchains to which users have role-based permissions. RSA is being used to enable public key encryption I e., generate public and private keys which are used for authentication. Although this framework succeeds to implement a Patient-centric method identifies security breaches and information leaks by recognising the patient in his role as data owner, the confidentiality of personal data is being compromised due to the fact that the information is stored in external repositories instead of reliable cloud-based storage.

In [4], A permissioned Blockchain-based system built on a Hyperledger fabric is implemented for EHR integration and data sharing. Hybrid data management approach is used. EHR will be encrypted with a hybrid cryptographic system that incorporates the effectiveness of a symmetric-key cryptosystem with the ease of a public-key cryptosystem, and data will be housed in HIPAA-compliant cloud storage off-chain. The system, however, faces the danger of a SPOF.

[9] discusses the use of Blockchain technology to protect cloud-based healthcare data. However, while it ensures data security, it does not allow for efficient and safe sharing of digital information, and there is no data privacy because the records can be viewed and updated by any healthcare worker.

In [10] Blockchain based scalable and secure data source for medical care is proposed as a solution for accessing data during emergency. However, an ambulance client app user who is not a member of the fabric network may abuse their privileges. Because the data is organized in folders, only a single record cannot be shared or given access to.

Access control ensures the security of information systems by ensuring that users have the necessary permissions to access the services they demand. There are concerns about privacy and the presence of a third party in [11].

[12] Provides data privacy, security, and traceability, as well as low storage costs, low latency, and availability, for IoMT-based distributed healthcare systems. The app, however, is limited to wearable devices and does not leverage the intelligence by using AI/ML technology and NLP to extract critical insights and intuition from a patient's data.

[13] introduces a multi-cloud architecture with Blockchain-based immutable EHR storage, where transactions are timed to enable efficient block elimination, according to the patient's scheduled appointment. However, the doctor uploads the data to the EHR, the patient has no control over it.

[15] Med Bloc is a fully functional, Patients and healthcare professionals may easily access and exchange health information via a dedicated client service, which is powered

by people. Patients can grant and withdraw consent at any moment using smart contracts and cryptographic methods. They haven't used the cloud to store data for greater security in any event.

[16] The researchers employed MCDM's hybrid fuzzy-ANP TOPSIS system to assess Blockchain technology models' influence. The Private Blockchain model was recognised as the highest weighted choice, achieving the top place among the chosen Blockchain models for providing secure EHR services in healthcare organisations.

[17] Because any worker authorised to access the information has access to records, Blockchain allows for easy access to them. It can be accessible from anywhere because it is deployed on a distributed network. The system might be enhanced by giving rapid access to medical records in an emergency. Its structure could be changed to suit a specific condition or to follow industry best practises.

[18] They produce and transport files between computers using techniques they are acquainted with. To reduce client effort, the system combines Secured File Transfer Protocol (FTPS) for safe file transfers with Blockchain as the final source of data. Authorisation, accountability, access control, and Strong identity management are required by the permissioned Blockchain, which is based on pre-defined business logic and consensus.

III. BLOCKCHAIN BASED EHR ARCHITECTURE

A. Preliminaries

The preliminary work that went into the proposed architecture is formally summarised in this section. It elaborates the platform that was used to create this mechanism. In the following section, the most prominent aspects for the implementation of this mechanism are mentioned.

I. BLOCKCHAIN AND ITS DEPENDENCIES

Innovation on Blockchain was proposed by Nakamoto, for his popular work on advanced money or cryptocurrency, bitcoin. Nakamoto made use of Blockchain innovation to solve the bitcoin double investment problem, but in a short.

To understand the Blockchain architecture, consider Figure 1, this illustrates the full process of a transaction on the Blockchain network being sent from a user.

a. A transaction submitted by user on the network signals the creation of a new block. Transactions are stored in blocks on the Blockchain, which are then transacted to every affiliated node of the network. A transaction placed within a block is broadcasted to all network nodes. Every node within the network has an imprint of the complete Blockchain, that helps with verification. Whilst a block containing the user transaction is propagated to all connected nodes, they check to ensure that the block has not been tampered with, in any case.

b. The nodes develop an agreement on blocks that are valid to be attached to the Blockchain and which cannot be attached, during the whole process of adding a block to the Blockchain. The linked nodes perform this validation by checking the transaction and

confirming that the person making transaction is an authorized member of the system using well-known mechanisms.

When a node victoriously completes the validation, the node is rewarded with an incentive.

c. A block is added to the Blockchain only after it is verified.

d. Once the full validation procedure is done, the transaction is completed.

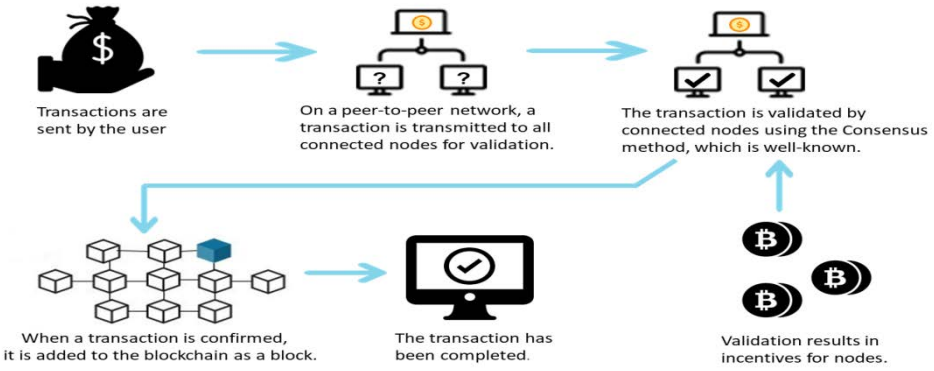


Figure 1. An Overview of Blockchain

The descriptions below explain some fundamental aspects of Blockchain technology.

- BLOCKS: A block has three elements: the data, hash of the current and the previous blocks. Depending on the type of Blockchain, the data could be anything. The data, like in the case of bitcoin, contains of coins that are truly electronic cash [13].
- IBM's HYPERLEDGER FABRIC BLOCKCHAIN PLATFORM: Hyperledger Fabric is Linux open source corporate Blockchain platform designed to serve as a premise for developing modular Blockchain solutions and applications.
- SMART CONTRACTS: Smart contract on Blockchain is basically a piece of code that may be used to do any action. When users send transactions, this code is performed. They are smart contracts that run directly on the Blockchain, keeping them secure from tampering and alterations of any kind.
- MEVN STACK: MEVN is an open-source JavaScript software stack that has emerged as a new and developing technique to construct powerful and dynamic online apps. By properly designing frontend and backend development, its software components may be leveraged to expand the functionality of your website or app.
- IDENTITY: A Blockchain network is made up of peers, orderers, client apps, administrators, and other organisations. An X.509 certificate protects the digital identity of each of these actors – active elements inside or outside of a network that can consume services. A trustworthy authority must verify an identity for it to be verifiable. This is accomplished in Fabric via a membership service provider (MSP). An MSP, to be more explicit, is a component that establishes the rules

that govern this organization's acceptable identities. Fabric's default MSP implementation employs X.509 certificates as identities and follows a standard PKI hierarchical paradigm.

A public key infrastructure (PKI) is a set of internet technologies that allows for secure network connections.

- *System architecture*

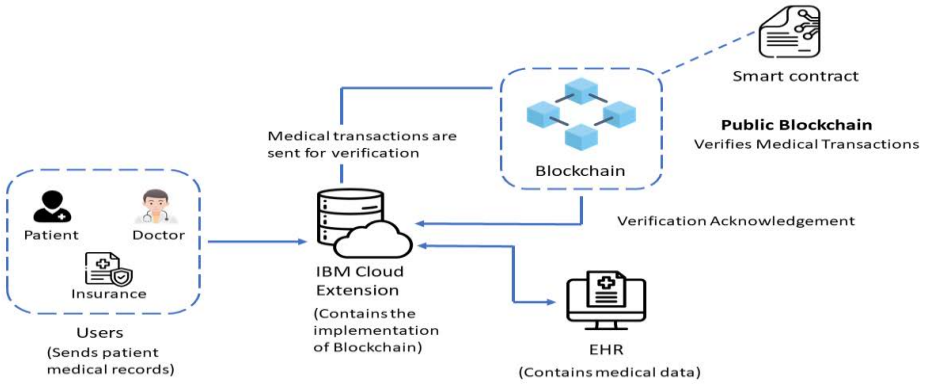


Figure 2. System Architecture

The web application provides a user interface that gives consumers quick access to the prototype's features and capabilities. The web portal can be viewed in three different ways: patient, doctor and insurance company. Patients can access the prototype's patient-specific features after they log in to the appropriate portal. Patients can access the prototype's patient-specific features after they log in to the appropriate portal. When a patient grants permission for the doctor to view their data, the data is encrypted and transferred to the cloud using the doctor's public key. Based on the permissions set by the patient, the doctor can read and update the data during the diagnosis period in the respective patient data files. Whereas the insurance agents can only view the data present in the EHR after authorization in order to offer protection against high medical costs.

The IBM Blockchain platform extensions produces smart contract in JavaScript that manages the assets. In the smart contract's source code, the extension creates a smart contract by combining the fabric-contract-api with a set of asset management functions. Information appended to the Blockchain will not alter once transactions are committed to the ledger since Hyperledger Fabric does not fork. A new transaction is the sole way to update the ledger. Due to the importance of data finality, the system employs a checks and balances protocol to ensure that transactions are legitimate, accurate, and verified. A transaction procedure in this case involves the following steps: initiation by an authorized client, user verification and signature, inspection and validation of user responses, and final validation of the transaction by all network peers. All of this must function successfully before a new block can be added to the network.

Users will receive the necessary credentials to connect to, access, and use the Fabric network resources after completing the registration and enrollment processes (peers, channels etc).The configuration allows network members to configure essential network components including identity verification and channel creation based on their agreement. This limits network access to only authorized users and that confidential transactions are conducted via channels. The user's access level determines whether they can view, update, or share the record.

C. Security basics

SHA 256

The public key cryptosystem, SHA-256 is being used to enable public key encryption I e., generate public and private key which are used for authentication.

Preparing and incorporating are the two main processes of SHA-256. The data is padded and then divided into subgroups. Subgroups are then merged with other subgroups and prime numbers. The subgroups are finally recombined to generate the final hash. This ensures that the registration process is encrypted, and user's personal information is safe.

Algorithm for Authentication:

STEP I: Start

STEP II: Input

read the entities [Patient, Doctor, Insurance]

STEP III: Registration using (Personal details)

Patient→ Name, age, Aadhar number, Phone number

Doctor→ Name, Age, License number, Phone number

Insurance→ Name, Age, License number, Phone number

STEP IV: Using SHA-256 to hash the personal details

STEP V: Generating unique ID

STEP VI: Authentication

The entities' claim of credentials will be verified by Wallet.

Step VIII: End

This system has two layers of security: first, Blockchain technology is safe and employs protocols and mechanisms to protect itself from third-party attacks. Second, our system employs role-based access, which restricts access to the system and its functions to users who have defined roles. As a result, our solution would secure not just the Access control of entities linked with patient records, as well as the security of patient information.

D. Proposed Methodology/work

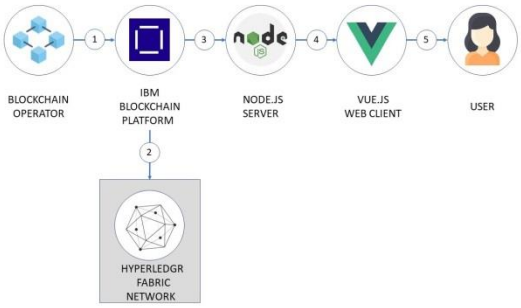


Figure 3. Overview of Proposed methodology

1. The IBM Blockchain Platform service is set up by the Blockchain operator.

2. The operator installs and instantiates the smart contract on the Hyperledger Fabric network created by the IBM Blockchain Platform.

3. The Fabric SDK is used by the Node.js application server to interface with the IBM Blockchain Platform network and generate APIs for a web client.

4. To connect with the network, the Vue.js client uses the Node.js application API.

5. The user uses the Vue.js web interface to register or login, as well as query the world state for records.

In Our proposed framework the application will be integrated with an Hyperledger Fabric to ensure that the patient's data is secure, and transactions are reliable. Hyperledger Fabric implements identity using public key infrastructure technology. Patients' hospital visits, reports, treatment details, physician's notes, laboratory results or reports, prescriptions, X-rays, and outcomes are all examples of transactions in our healthcare system. Patients will have data sharing choices with our system. They will now be able to choose which parts of their medical history are accessible to healthcare providers based on their needs, while keeping the rest of the data private and secure. To extract essential insights and intuition from a patient's medical history, machine learning and Natural Language Processing (NLP) is applied.

Each participant, such as a patient, doctor, or insurance company, is assumed to have a unique ID such as Aadhar number and licence number respectively. During the registration step, each entity must provide personal information and login with their username and password (Dpersonal). Our method uses SHA-256 to hash the Dpersonal and generates a unique ID from it. The patient's, doctor's, and insurance's unique IDs are Pid, Did, and Iid, respectively. The registration information (Dpersonal) is hashed and saved in an encrypted

format. After completing the registration procedure, each entity obtains a unique address in the Blockchain that correlates to its unique ID. The wallet will authenticate an entity's assertion of credentials once it has been registered.

A public and private key for the user with our certificate authority(CA) that is running on the IBM Blockchain cloud is created upon registration, and keys to the wallet.

When the doctor or insurance company receives access from the patient, they can log in with their respective credentials to download or see the records. They must provide an OTP sent to their registered mobile number before downloading it.

Workflow of proposed Scheme

Step 1: When a new Electronic health record file [EHR = Pid||Did|| Iid] is produced, the EHR is signed with the doctor's signature Dsig here in case of doctor, encrypted using the patient's public key SKpub, and then uploaded to the doctor's wallet [CipherEHR ESKpub (EHR||Dsig)]. Using asymmetric key encryption, we ensure that the patient and other entities have complete control over the accessibility of medical documents.

Step 2: The Blockchain saves the relevant reference index number and hash when encrypted EHR file is submitted to the wallet.

Step 3: When a patient visits a hospital, access to the patient's historical EHRs will be seeked, which will trigger a smart contract. The smart contract will authenticate the doctor's or insurance identity, EHR's index number and then provide access (allow or refuse) to them based on the patient's consent as established in access policies. If successful, patient uses his or her private key SKpriv, SKpriv,[EHR ← DSKpriv (CipherEHR)] to decode the CipherEHR.

Step 4: To compute the shared secret key, KES, both entities share ephemeral keys. To send the EHR file to the doctor B/ insurance, the patient re-encrypts it with KES, signs it with his Ksig, [ReCipherEHR EKES (EHR||Ksig)], and sends it to him. Doctor B utilises his KES, [EHR DKES (ReCipherEHR)], to decode it. Finally, it will check the EHR's integrity using doctor A's public key Dpub and patient EKpub's ephemeral public key EKpub to ensure that it has not been tampered with. When the access period expires, RC notifies the doctor and patient, and the keys expire at the same time, with the smart contracts updating the activity list. The doctor or insurance firm will lose access to the EHR and will have to request the patient view the file again.

This type of access control ensures that only authorised individuals have access to the EHR, prohibiting unauthorised access. Through encryption technology, our recommended access control solution enables protection of identity and data integrity while maintaining patient-centeredness. The wallet is in charge of confirming credentials of an entity. Because of the small block size and big size of the EHR file, it also serves as storage, with the EHR file's hash being uploaded to boost the efficiency of our method to the Blockchain.

When it comes to sending EHR data over Blockchain, scalability is a major concern, like as photographs, can be incredibly huge. Due to the network's distributed duplicated nature, it is impractical to store and copy EHR data on a Blockchain network for sharing. All metadata is stored on the chain (such as transactions, EHR information, and access control), while shared sensitive EHR data is saved and maintained in an IBM cloud. The shared EHR offers excellent scalability, durability, availability, and low latency, as well as near-perfect security (encrypted at both transmission and rest) and low cost.

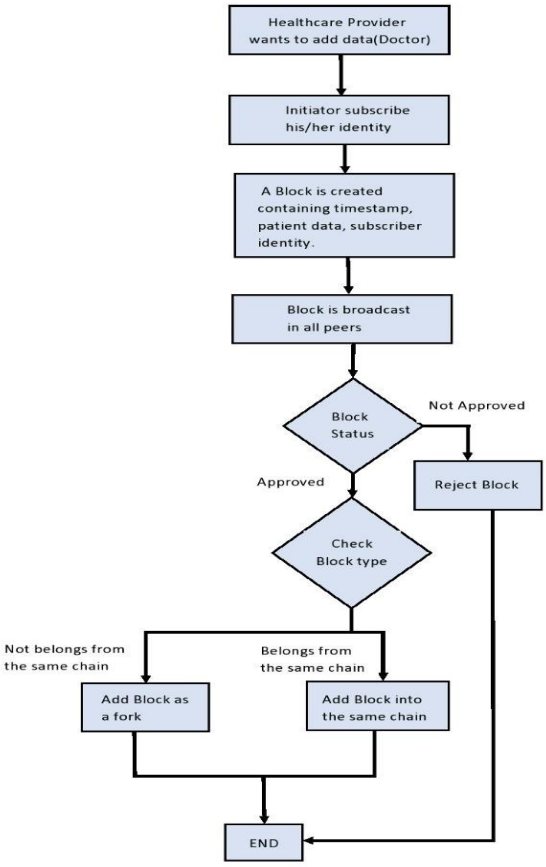


Figure 3. Access control Flowchart

Functioning of the smart contract approach

The approach explains how the smart contract for patient records works. The three functions of this method are to define add, view, and update records. Users of the system make advantage of these features. The doctor performs the first function, which is to add a

patient record. This function also ensures that the task is being carried out by the doctor's account's verified public address and not by a third party. After the doctor has completed the validity check, he or she can add the patient's records and then save the record to complete the function. View patient records is the second function, which requires the patient id that will be stored in a variable. The system would look for the patient's information using this id and then return the data to the user that had requested them. Validation for the given roles of patient, doctor, and insurance is also included in this function. Only authorized entities would be able to see the information. The third function is update patient records, which is utilized by the doctor to make any modifications to the patient's stored records. To guarantee that only authenticated users have access to this function, the validation procedure is repeated.

IV. RESULTS AND DISCUSSION

This section demonstrates our approach's practicality, and we discuss how healthcare industry, especially electronic health records, might benefit from Blockchain technology. Despite recent advancements in healthcare and in EHR systems, there were still some challenges that this unique technology, Blockchain, addressed. Our recommended solution combines secure document storage with precise access control constraints. Only trusted and related individuals have access to medical records, therefore the system benefits from role-based access as well. This also tackles the EHR system's information asymmetry problem. In the future we would like to create a database more tamperproof.

Paper	Cloud	Admin/ Hospital	Insurance	Role specific login/ Registration	Secured downloading
Blockchain based approach for securing health care data	✓	X	✓	✓	✓
Blockchain based EMR using smart contract	X	✓	X	X	X
E-health data access management	X	✓	X	X	X
Health Chain	X	X	X	✓	X
A Panacea for Healthcare	X	✓	X	✓	X
Securing Medical Data	✓	✓	X	✓	X

Table 1: Comparative analysis of features

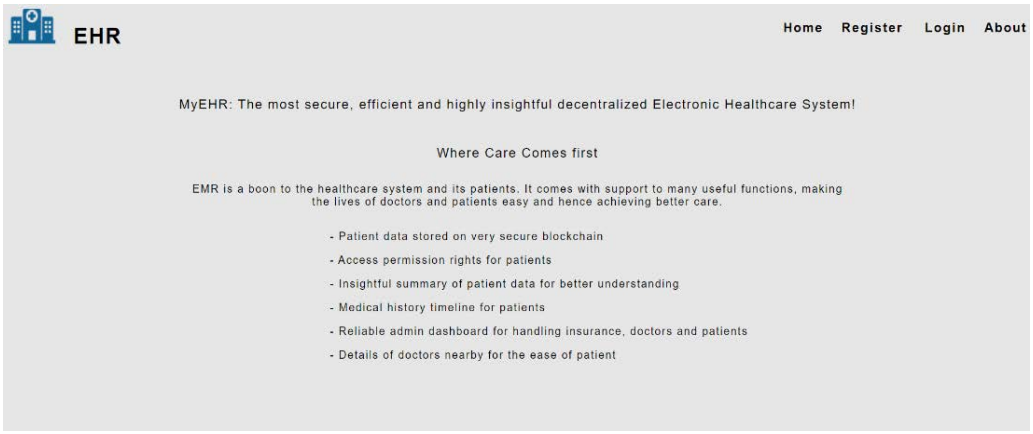
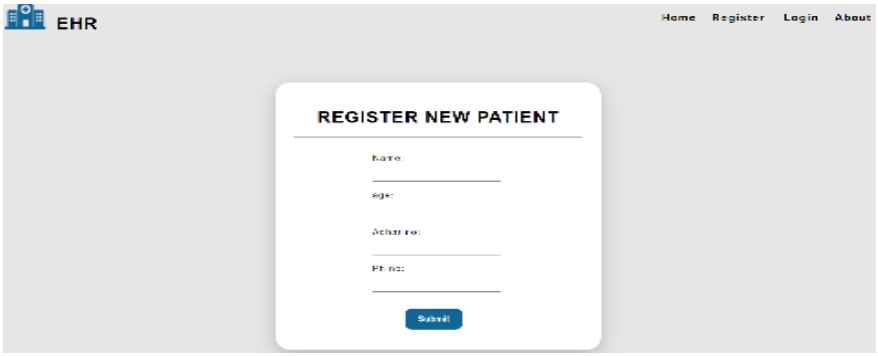
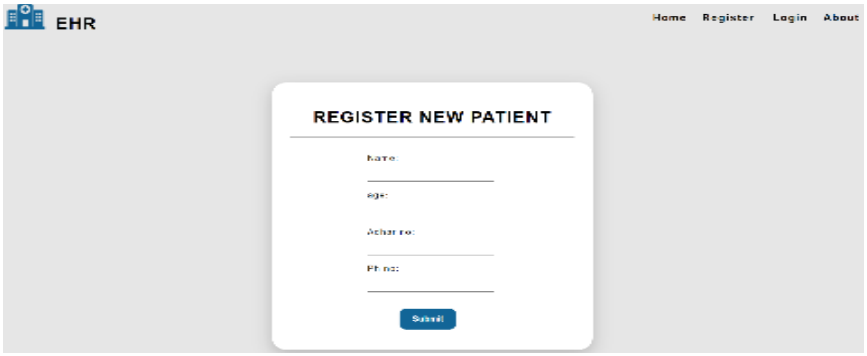


Figure 4. Home Page of the Web Portal





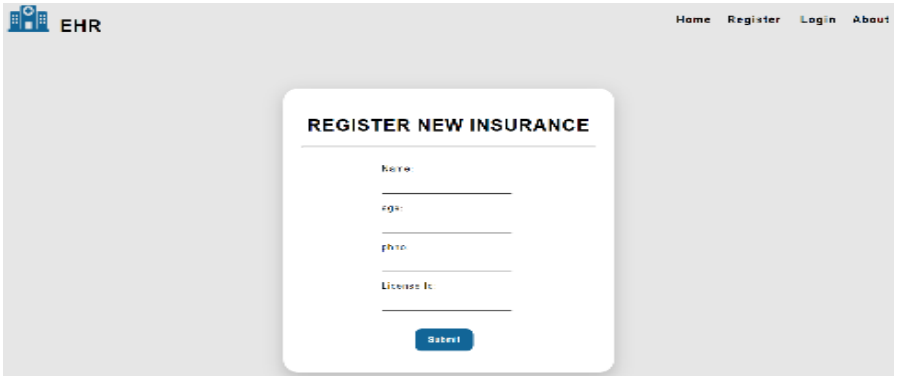
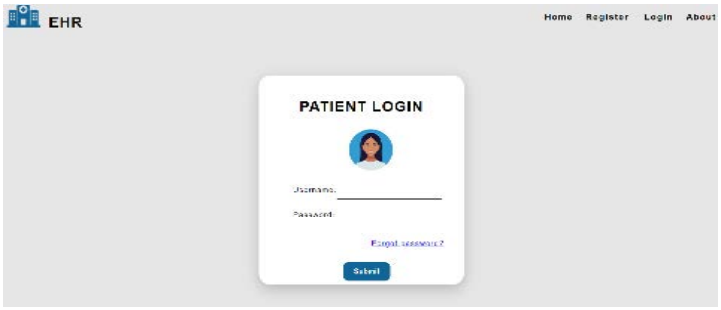
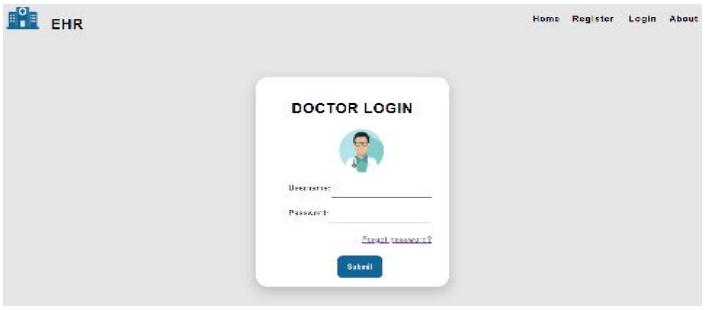


Figure 5. Registering new user





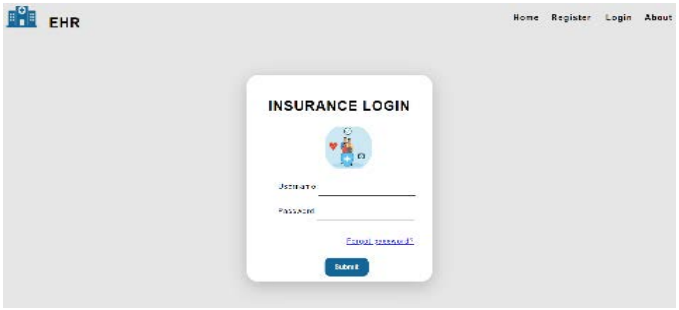


Figure 6. Access based Login

On registration the following will be generated which is used for further transactions.

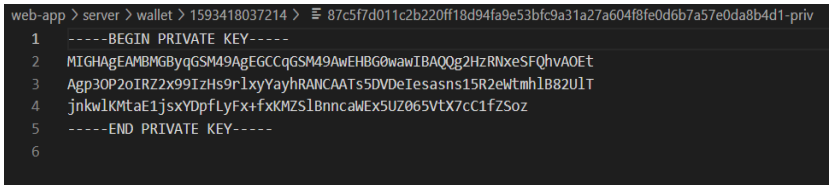


Figure 7. private key

Figure 8. public key

Figure 9. certificate

V. CONCLUSION

In this paper, a Blockchain based framework has been presented for secure storage of EHR using which the authorized entities can carry out respective transactions without intervention of any third party. This proposed system satisfies the criteria required by personal information protection rules. Because the data access is unambiguous, supplementary entities can obtain health information based solely on security regulations. The use of such a convention in real life would provide several benefits to all parties concerned. Patients must be able to easily manage their medical analyses and hospitals should be able to give better medical care, without causing patients to be concerned about the private information they are disclosing.

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SECURITY CHALLENGES IN IOT

[1]S. Selvakumari, [2]P. Ganeshbabu, [3]V. Vaneeswari, [4]K. Saraswathi

Department of computer Science, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Emai : selvakumaris5589@gmail.com **(S.Selvakumari)** *Corresponding author:* S.Selvakumari

Abstract **-** In remote communication networks, security risks are particularly high. The military, business, healthcare, retail, and transportation industries are among the most common uses of distant communication networks. Wired, cell or ad hoc networks are used in these architectures. There has been a lot of attention paid to remote sensor groups, actuator organisations, and vehicle organisations. The Internet of Things (IoT) has recently received a lot of attention from researchers. For others, the IoT is seen as the web's last chapter. Moreover, the Internet of Things (IoT) will play a pivotal role in the future, transforming our lifestyles, conventions, and business models. The Internet of Things (IoT) enables billions of devices, people, and organisations to connect and exchange information. The IoT networks are vulnerable to a variety of attacks because of the increased usage of IoT devices. Effective security and protection protocols are anticipated to provide privacy, verification, access control and trustworthiness among other things in the IoT network's security architecture. IoT network security and protection are discussed extensively in this study.

Keywords—Internet of Things (IoT); security, privacy

I. INTRODUCTION

The Internet of Things (IoT) has received a lot of attention in the last few years. In 1999, Kevin Ashton came up with the concept of the Internet of Things. As a result of rapid advancements in wireless communication, wireless sensor networks (WSN), radio frequency identification (RFID), and cloud computing, IoT devices have gotten more useful than they were before. There are many IoT devices that can function together. Advanced mobile phones, personal computers (PCs), personal digital assistants (PDAs), work stations and tablets are just a few of the devices that make up the Internet of Things (IoT). Communication between IoT devices, as well as the transfer of important data into the integrated system, is based on realistic sensors and remote correspondence frameworks. IoT devices' data is processed in the included framework and sent to the intended objections. Our daily routines are more centred on the anecdotal space of the virtual world because of the rapid growth of communication and online innovation [1]. In the virtual environment provided by the organisation, individuals may work, shop, visit (maintain pets and plants), and so on. As a result, it is impossible to totally replace human activities with mechanical

ones. When it comes to the future of web administrations, there is an anecdotal area that serves as a jumping-off place. This current reality and the anecdotal space have been successfully integrated into the IoT. Smart life, clever items, sharp health, and dazzling urban environments are only a few examples of the IoT's important priority areas [2]. The Internet of Things (IoT) gadgets are catching on fast these days, with an ever-increasing number of devices connected to the internet. By 2020, there will be 30 billion linked items with around 200 billion relationships that will bring in roughly 700 billion euros in revenue, according to an investigation [3]. Currently, there are nine billion devices in China, and that number is predicted to rise to 24 billion by the end of 2020. IoT will fundamentally alter our way of life and how we make decisions in the future. Individuals and devices will be able to communicate anytime, anywhere, and with any device under perfect circumstances, using any network and any help [4]. Predominant world for humans in the future is the major goal of IoT.

Although many of these gadgets and apps are not designed to cope with the threats to the IoT firms like secrecy and authentication, information integrity, access control, and so on, this creates a slew of security and protection difficulties in the IoT organisations. Aggressors and intruders target IoT devices on a regular basis. In a study, 70 percent of IoT devices were found to be very vulnerable. An efficient method to protect web-connected electronics from hackers and gate crashers is thus needed.

II. IOT APPLICATIONS

The Internet of Things (IoT) has received a lot of attention in the last few years. In 1999, Kevin Ashton came up with the concept of the Internet of Things. As a result of rapid advancements in wireless communication, wireless sensor networks (WSN), radio frequency identification (RFID), and cloud computing, IoT devices have gotten more useful than they were before. There are many IoT devices that can function together. Advanced mobile phones, personal computers (PCs), personal digital assistants (PDAs), work stations and tablets are just a few of the devices that make up the Internet of Things (IoT). Communication between IoT devices, as well as the transfer of important data into the integrated system, is based on realistic sensors and remote correspondence frameworks. IoT devices' data is processed in the included framework and sent to the intended objections. Our daily routines are more centred on the anecdotal space of the virtual world because of the rapid growth of communication and online innovation [1]. In the virtual environment provided by the organisation, individuals may work, shop, visit (maintain pets and plants), and so on. As a result, it is impossible to totally replace human activities with mechanical

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B. Medical Devices

Additionally, IoT gadgets in medical care frameworks are used to monitor and evaluate patients [7]. Personal Medical Devices (PMDs) may either be implanted in a patient's body or connected to the patient's body through a wireless connection. PMDs, or personal monitoring devices, are becoming more commonplace and well-known. It is estimated that by 2019, the value of these devices would be worth an estimated $17 billion [8]. They employ remote interfaces to communicate with a base station, which is also used to read the gadget status, clinical reports, and adjust the limits of the gadget, or update status on the gadget. The patient's safety and security are jeopardised significantly when they are exposed to remote interface. Such devices are vulnerable to cyberattacks that might jeopardise the patient's safety, security, and well-being. For medical treatment, the most important goal is to ensure the safety of the organisation in order to prevent the patient from being attacked out of revenge. A typical goal is to steal data, attack devices to get access to their resources, or turn off particular programmes that monitor a patient's status.

Among the various attacks on medical devices include eavesdropping where the privacy of the patient is violated, respectability errors where the message is tampered with, and accessibility concerns where the battery is depleted. The following are a few network security threats related to the safety, security, and well-being of patient clinical information:

Any project that relies on battery power requires the use of power management devices (PMD). Because of this, only a limited amount of data can be sent using these devices. A device's categorization, accessibility, security, and honesty are all jeopardised if it's part of many groups.

Due to the fact that PMDs do not have a means for verifying distant communications.

It also exposes the devices to several additional security threats, which might lead to nasty attacks.

In the C. Smart House

Advanced gadgets may effectively communicate with one another using Internet Protocol (IP) addresses as IoT eager home administrations grow [9]. In a smart home atmosphere, all of your slick home devices will be linked to the internet. Increasing the number of devices in the smart home raises the risk of malicious attacks. Malicious attacks are less likely to occur if smart home devices are used freely. As of today, web-enabled smart home devices may be accessed from any location at any time. It increases the likelihood of malicious attacks on these devices. In a smart home, a variety of devices are linked together and intelligently communicate information through a home network. As a result, there is an entrance to the home network that restricts the flow of data amongst shrewd devices connected to the outside network. There is a specialised co-op that provides a wide range of services to the home organisation.

III. SECURITY REQUIREMENTS

In the Internet of Things (IoT), devices and people are linked together to provide various forms of help at any time and from any location. Web-connected devices lack appropriate security components and are vulnerable to a wide range of protection and security concerns, including the categorization, honesty and validity of the information they contain, and so on and so forth. The Internet of Things (IoT) necessitates that certain security requirements be met in order to protect the company from malicious attacks [7, 10]. In this section, the most critical capabilities of a safe company are briefly reviewed.

Strength in the face of adversity: In the case of a system failure during data transfer, the framework should be able to self-recover. Models and servers functioning in multi-user environments should be intelligent enough to protect themselves from gate-crashers and other

nosy neighbours. For the current circumstances, if it were to go down, it would be able to recover without alerting its customers.

It's important to verify the accuracy of the information and its associated data. To ensure that only genuine devices may transmit data, a validation mechanism is used.

Only those who have been pre-approved are granted access control. It is the chairman of the framework who should be in charge of restricting access to the data set or projects for different customers by dealing with their usernames and passwords and describing their entry freedoms.

The client's data and information should be protected. In order to safeguard customers, only authorised individuals should be able to access their personal data. Because of this, no framework or non-essential verified client may have access to a client's personal information.

IV. CHANLLENGES

The Internet of Things (IoT) era has altered our way of life [12]. There are several security risks associated with the Internet of Things (IoT), despite its many benefits. Data leakage and administration loss are two of the most common security threats. There is a clear correlation between IoT security risks and the real risk. The Internet of Things (IoT) consists of a wide range of devices and platforms, each with its own set of certifications and security requirements. It is also critical to ensure customer security since personal data is increasingly being dispersed across several devices [13], [14]. Individual data will now be protected by a reliable mechanism. In addition, a wide range of devices that communicate with many organisations are available for IoT administrations. To put it another way, it suggests that there are a lot of security vulnerabilities on both the client and network layers. Various courses might also give information about customer protection. In the IoT, some security risks are as follows:

Data lifecycle assurance from end-to-end E2E: Data in an IoT environment must be protected from beginning to end in order to ensure its safety. Information is acquired from a variety of devices linked together and immediately sent to further devices. In this way, it is necessary to have a system in place to maintain the security of information, classify information, and monitor data protection across the whole life cycle of information.

Organizing things in a safe way: The IoT devices' connectedness and correspondence shifts as a result of the situation. The devices must be able to stay up with the current degree of security. For example, if adjacent gadgets and sensors in a home-based business are able to communicate securely with one another, their communication with external devices should also be safe.

Misconfigurations by customers are the primary cause of security issues, and the majority of these issues can be remedied. It is very difficult and unfair for customers to implement these complicated security systems. It's anticipated that you'll choose security measures and, if necessary, security measures and tactics that may be used in the future.

The Dangers of an Intelligent Home

A huge portion of the home service providers don't consider about security limits when they start out, putting them at risk for cyberattacks. Unauthorized access to a smart home network compromises its security by listening in, causing a Distributed Denial of Service (DDoS) attack, and leaking data.

1) Trespass: The aggressor may enter the clever house without smashing the entrance if the lock on the clever door is impacted by noxious codes or is accessed by an unapproved person. This impact might result in a mortality toll or a loss of property. In order to prevent such attacks, passwords should be updated often and include at least 10 characters, which is very difficult for attackers to crack. Access control may also be used in conjunction with the verification component.

Monitoring and leakage of personal data are two important reasons for a smart home. Consequently, there are a lot of sensors that are used to monitor fires, children, and housebreaking. If these sensors are hacked by a trespasser, he will be able to monitor the residence and acquire personal information. Encryption of entryway and sensor data, or client validation to detect unapproved gatherings, should be used to ward off this attack.

For example, an attacker could gain access to the home organisation and send mass messages to devices like Clear To Send (CTS)/Requested To Send (RTS) (RTS). DoS attacks on various devices in a smart home can also be performed against a designated gadget using vindictive codes. As a result, high-tech devices are unable to carry out their intended functions because of dwindling resources. Confirmation may be used to prevent and detect unauthorised access and evade this attack.

The attacker may collect the packages by modifying the directing table in the door when smart home devices communicate with the app server. An aggressor may be able to circumvent the SSL (secure attachment layer) approach, even if it has been applied, even though the declaration has been generated. As a result, the aggressor has the ability to confuse the content of information or to disclose information classifications. So that this attack might be used to get the keen domestic organisation , SSL method with legitimate verification system ought to be applied. It is too critical to impede unapproved gadgets that might attempt to get to brilliant home organization.

Imagine a future when physical items linked to the web can communicate with one other and differentiate themselves for various devices. This is known as IoT (Internet of Things). Associating one person with another, a human with real articles, and an actual thing with other actual objects was made easier by the Internet of Things. IDC estimates that by 2020 there will be 30 billion web-connected devices. In order to keep up with the rapid growth of online content, more substantial and safe structure is needed.

Challenges Faced by the Internet of Things

The biggest challenge in IoT is dealing with the issue of security. An application of IoT's application information might be contemporary, a business endeavour, or an individual buyer. Moreover, this application data must be collected and kept private against theft and alteration. It's possible that a patient's health or purchasing habits may be recorded by IoT apps. Interaction between devices is a key component of the Internet of Things, yet there are challenges related to the IoT's flexibility, accessibility and response time. Security is a concern when data is sent via the Internet. Unofficial laws, like as the Health Insurance Portability and Accountability Act (HIPAA), may be used to protect the information when it travels across international borders. The most major IoT security concerns are discussed, among a variety of others.

There are certain smart TV manufacturers that collect information about their customers in order to better understand their survey propensities so that the information they obtain may be tested for data security during transmission.

It's also a great test to see how secure your data is. Avoid being distracted by web-connected items when transferring data perfectly.

IoT-enabled devices on automobiles may be used to collect information about a driver's health and driving habits, which insurance companies can use to make decisions regarding insurance coverage.

As a result, there is a lack of a standard for IoT devices and IoT-related businesses. As a result, determining which devices are authorised and which are not is a significant challenge.

Due to the increased use of IoT devices, the amount of traffic generated by these gadgets is also increasing. As a result, there is a pressing need to extend the network's capacity, and it is also a challenge to store the enormous amount of data for further research and final storage.

In the context of system security, the IoT framework is used to identify different security threats, create different security systems, and establish acceptable security rules to ensure network security.

For IoT applications, the application security works to deal with security risks as per the situation's requirements.

It's important to have a secure network in place to ensure that different IoT devices can communicate with one another.

V. CONCLUSION

This paper's primary focus was on highlighting important IoT security challenges, with an emphasis on security attacks and responses. Numerous IoT devices become susceptible targets due to the lack of a safety component, and in fact, this isn't even in the casualty's information about being infected. In this study, the security requirements, such as categorization, trustworthiness, and verification, are studied in detail. A total of twelve distinct attacks are evaluated, each with a corresponding degree of severity (low, medium, substantial, and wonderfully significant) and their inclination/conduct, as well as possible responses to the assaults' experience.

Considering the importance of security in IoT applications, include security features into IoT devices and communication networks. In addition, avoiding using default passwords for devices and reading the security requirements for devices before using them for the first time are recommended for preventing gate crashers and security risks. Reduce the likelihood of safety attacks by incapacitating provisions that aren't being used. Examine various security protocols used by IoT devices and organisations. Besides that,

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Satellite Imagery Analysis

[1]Dr. Laxmi B Rananavare, [2]Dhruthik U, [3]Charan L K, [4]E Nikhil Kumaraswamy, [5]Dhanush K

School of CSE, REVA University

[1]*laxmib.rananavare@reva.edu.in*, [2] *dhruthik28@gmail.com, charanshetty8435@gmail.com, nikhil.erigila09@gmail.com, dhanushnaidu2000@gmail.com*

Abstract.

In the EuroSAT dataset, deep learning methods are utilized to categorize land cover and land use. A detailed explanation and Python implementation of the 3D-CNN model for categorizing land cover in satellite pictures. For land cover classification in satellite images, SVM, K-Nearest Neighbour Classifier (K-NNC), Logistic Regression, and Tree-based Algorithms have traditionally been utilised. Deep learning and processing power developments have aided in the development of effective deep learning models for land cover classification. CNN (1D, 2D and 3D) are a popular architecture for extracting likely spectral and spatial information from satellite data that is vital for land cover classification. We will look at a simple explanation and implementation of 3D CNN for land cover categorization in satellite images.

Keywords 3D CNN, K-NNC, SVM, Satellite

1. INTRODUCTION

In recent years, the field of artificial intelligence and machine learning has advanced quickly. Machine learning techniques are used to enhance the outcomes of almost all study disciplines. Another key concern was the scarcity of labelled and clean data. However, in the majority of domains, public datasets are now available, which leads to innovation and entrepreneurship.

However, geographical data are required in some studies, and these datasets are not widely available. Because acquiring satellite imagery is expensive in and of itself, and only a few organizations make it available to the public. Even if they made it public, machine learning requires a large amount of labelled data to create models and generate relevant results.

However, government initiatives are currently making significant efforts to convert satellite photos into a free and open-source format that is widely utilized and yielding positive outcomes. To acquire additional insights from these satellite data, we must segment and interpret it for future research. Such a job is land cover and land use classification, which may provide insight into how land usage is occurring and changing through time. Satellite photos of various spectrums are captured and kept throughout time; when this sort of data is available and labelled, it may be utilized for future research. We are attempting to employ deep learning algorithms to deal with land cover categorization using the EuroSAT dataset in this project.

2. LITERATURE SURVEY

This research paper expresses the importance of satellite imagery in capturing the data in a short period of time over a large scale.

With the development of sensors and resolution of lenses, along with image enhancing techniques, it demonstrates that research based on satellite data saves time, money, and boosts the potential to recognize land using spectral analysis. [1]

This article relates artificial neural networks with biological neural networks. It acquires knowledge through learning and the information is stored in the inter-neuron connection strengths.

ANN receives information from external world in a pattern, after some processing it is fed into the activation function to get the desired output.

It has multiple layers of neurons which gather information from one another, resulting in a deep network.

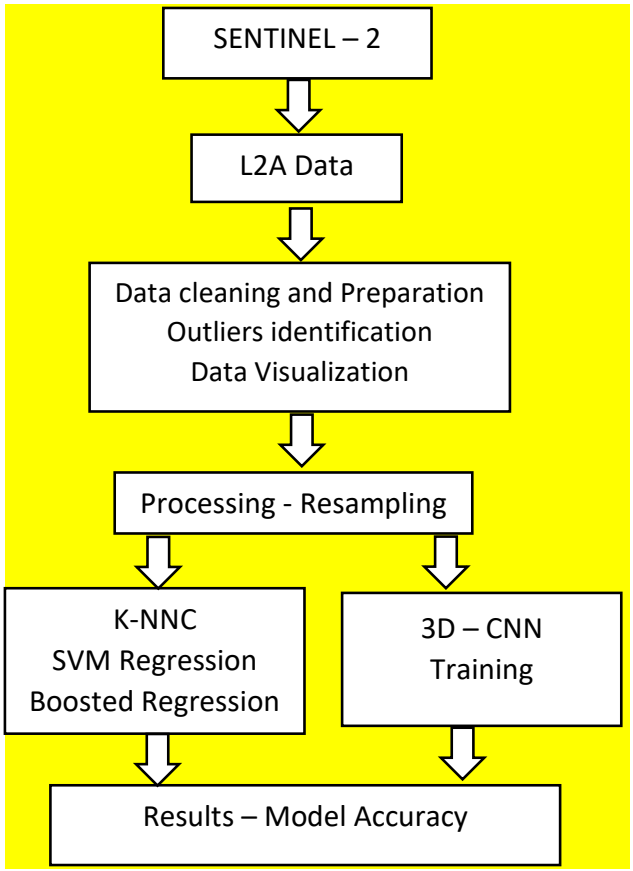
It is shown to have provided excellent results in object identification and can be used in sensing applications. [2]

In this paper the demand for methods for classification is identified, which in turn depends on the intelligent earth observation and the progress in this field. In the recent decades we have been using these images classification in applications such as natural hazard detection, image retrieval, vegetation mapping etc. The authors identified that we should rather focus on spatial patterns rather than analysis of single pixels. [3]

This paper focuses on an essential component in visual systems which is Image segmentation. It has a vast range of applications. Algorithms such as thresholding, k-means clustering, Markov random fields, etc. have been developed. But deep learning has provided models with more performance. Image segmentation can be looked as a classification problem which assigns a label to an image.

This paper discusses and gives an insight on most of the segmentations methods that has been developed. [4]

3. METHODOLOGY



Dataset - We used sentinal 2 satellite data. This is retrieved from sentinal hub website. It consists of multi spectral setellite images of 12 bands.

Visualization - Visualization gives us a better understanding of the data. The raw satellite images are difficult to comprehend. We use pythion libraries to visualize the data in a more familiar way

Data Cleaning - Satellite images are often captured with noise features, caused by clouds. Detection of clouds is performed for the data and once its detected we either find a better dataset or remove the cloud feature using some models.

4. MODEL IMPLEMENTATION

We are using the following models for our prediction and measuring the accuracy of the models –

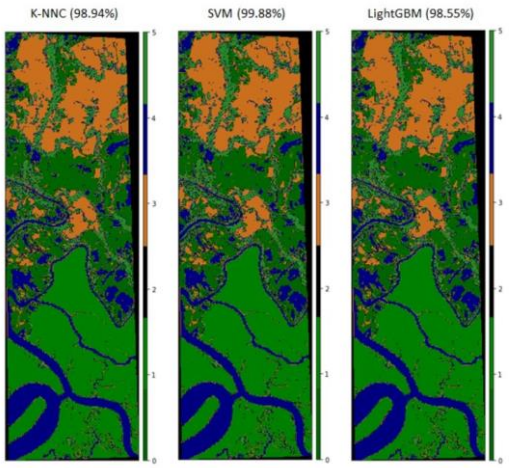
SVM - SVM is a prominent Supervised Learning algorithm that is used for Classification and Regression issues. It is based on strong prediction approaches established from statistical learning frameworks. SVR's primary concept is to locate the optimum fit line. The best fit line in SVR is the hyperplane with the greatest number of points.

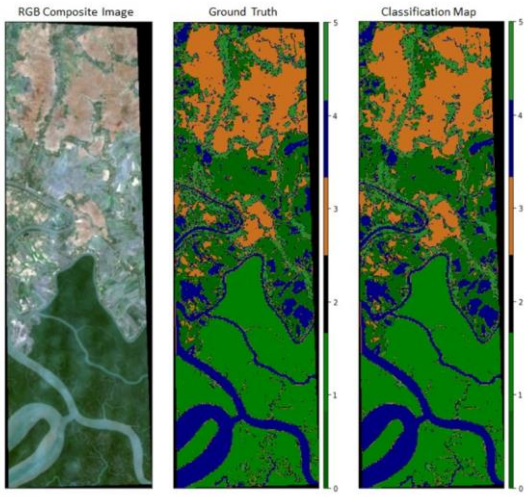
KNNC – K-Nearest Neighbour is a well-known Machine Learning technique, and its training phase consists solely of storing the feature vectors and class labels of the training samples. The K-Nearest Neighbor Classifier is a non-parametric technique, which means it makes no assumptions about the underlying data. It thinks the new data and available data are comparable and moves the new data into the category that matches the available categories.

Boosted - The Boosted Regression Tree is a machine learning model that uses past and present data to predict future performance. This model incorporates two algorithms: prediction accuracy-improving boosting methods and decision tree algorithms. In order to improve model accuracy in prediction, BRTs, such as Random Forest modes, would deploy a variety of decision trees on a regular basis.

3D CNN - The 3D CNN requires three-dimensional data as an input, so we must divide the satellite image into patches, each with its own class. The patch's class label has been defined as the class of the patch's centre pixel. Every patch has a size (W, W, B). Where W and B represent the size of the window and the number of bands, respectively.

5. RESULTS





	precision	recall	F1-score	Support
Class-1	0.95	0.91	0.93	16222
Class-2	0.99	0.99	0.99	23570
Class-3	1.00	1.00	1.00	6095
Class-4	0.95	0.97	0.96	16790
Class-5	0.96	0.97	0.97	13545
Class-6	0.84	0.89	0.87	9066
Accuracy			0.96	85288
Macro avg	0.95	0.95	0.95	85288
Weighted avg	0.96	0.96	0.96	85288

6. CONCLUSIONS

In this paper, we have addressed the issue of categorising land covered and used. The images obtained by satellites that operate remotely and are controlled by the government are being used as dataset for this purpose. This collected data that we used has been procured from Sentinel-2 satellite which is a part Earth Monitoring program.

We used CNN to set a standard for this dataset's spectral bands. For this new dataset, the outcome of the 13 unique spectral bands has been investigated. Based on this examination, the RGB band composition outperformed the SVIR and colour IR band combinations in classification accuracy, with the overall classification precision of 95.60%.

This research is the initial step in utilising the enormous quantity of available satellite data in machine learning, allowing for broad-scale monitoring of land surfaces of the Earth. The proposed dataset is ideal for a wide range of current time Earth observation applications. Detecting changes in land cover and use, and also updating geographical maps, are two possible applications.

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Lung Cancer Detection using 3D CNN

Dr. S Ayyasamy

Ayyasamy.S@reva.edu.in

Koushik R

R18CS189@cit.reva.edu.in

Manjunath S

R18CS216@cit.reva.edu.in

Manoj S

R18CS217@cit.reva.edu.in

Kushal P

R18CS197@cit.reva.edu.in

Abstract:

Lung cancer detection is an effective technique to reduce mortality rates and increase patient survival rates. Screening computed tomography (CT) scans for pulmonary nodules is a pivotal step in the effective treatment of lung cancer. Due to the complexity of the surrounding environment and the variety of the lung nodules, robust nodule identification and detection is a key task. In the recent years, the utilization of machine learning to identify, forecast, and categorize illness has exploded, particularly for complicated tasks like detecting and identifying lung cancer. 3D Convolutional Neural Networks (3DCNNs) have risen in prominence as a method of revolutionizing research in machine learning. In this study, we use a 3D Convolutional Neural Network for classifying lung cancer utilizing CT scan images from the IQ-OTHNCCD lung cancer dataset for identifying malignant and noncancerous lung nodules and assessing classification accuracy.

Keywords: Computer Vision, Lung Cancer, DCNN, Computed Tomography

I. INTRODUCTION

One of the major causes of increased fatality rates throughout the world is lung cancer, with many more fatalities occurring each year owing to lung cancer than from other forms of cancer. This terrible illness affects both men and women equally. As a result, adequate procedures for early detection and identification of this disease should be adopted in order to help and save people's lives. The survival rate of a large number of patients can be enhanced if it is diagnosed and identified in the early stages. After a condition has been identified, offering correct diagnosis can help patients live longer. Thus, increasing the quantity of duplication for the methods utilized will increase classification accuracy by utilizing new machine learning approaches in the medical image processing domain in order to produce a suitable and quick result. Consequently, quick diagnosis and identification in the early stages of the disease will almost certainly enhance the degree of survival and lower the death rate.

Images from computed tomography (CT), magnetic resonance imaging (MRI), and mammography were employed in the bulk of the early studies. The expert doctors in this field analyses these photographs with proper instruments in order to detect and diagnose various degrees of lung cancer. Among the laboratory and clinical approaches employed are treating using chemicals to kill or suppress malignant cell duplications, chemotherapy, and radiation therapy. All of the methods for detecting and diagnosing cancer problems are tedious, pricey, and inconvenient for the patients. To solve all of these challenges, appropriate machine learning algorithms for analyzing medical images, including CT scan data, were used. When compared to other diagnostic imaging such as MRI and X-Ray, CT scan images are selected over other images because they have lesser noise.

In the process of lung cancer classification, the pictures applied at the input layer of Deep Convolutional neural networks are labelled as malignant or non-malignant at the output layer after processing in all the hidden layers of the network. DCNN is a deep learning system that accepts input in the form of an image and assigns importance to each item in the image. When the network has been trained with a large number of datasets, it may further classify each item in the image. In comparison to other image processing techniques, deep learning approaches need the fewest pre-processing steps. The goal of DCNN is to transform input pictures into processing-ready formats with the least amount of image feature loss possible to attain the highest degree of accuracy. To develop and increase classifying accuracy in the DCNN, the filter size, the number of invisible layers, and the obtained number of feature maps are all used. As the network layers get more complex, a higher detection level and a higher level of

feature abstraction may be attained. Due to the increased number of Convolutional operations, the deeper the network, the longer it takes to compute. Convolutional filters of 3 x 3 or 5 × 5 dimensions are the most suited. The network's performance may degrade as Convolutional kernel's size becomes greater. The following is an overview of the structure of the paper: Section II describes the literature review, Section III summarizes the methods employed in depth, Section IV discusses the findings and comments, while Section V sums up the conclusion and future work.

II. LITERATURE SURVEY

With 1006 photos from the LIDC dataset [1] the Convolutional neural network was utilized for classification, yielding 94 percent accuracy with 90% training and 10% testing images. The author [2] proposes using computed tomography scans to identify lung nodules, with a sensitivity of 90% and a greater patient survival rate. Employing techniques such as the wiener filter and picture slicing, the region of interest is extracted. The 3mm nodule size is used to detect cancerous nodules in the lung still in the early stages.

The author [3] suggested a process to categorize nodules of the lung using Computed Tomography scan images, in which the scanned lung is sub-divided using thresholding and region growth techniques, and image characteristics are retrieved as a result. The collected characteristics were fed into several classifiers, such as the support vector machine and the KNN, which subsequently determined and classified benign and malignant pictures. For recognizing lung nodules, the author suggests a Convolutional neural network classifier [5], which has an accuracy of roughly 84.6 percent 82.5 percent sensitivity and 86.7 percent specificity are also reached. It should be highlighted that as the dataset size grows, so will the degree of illness treatment. The author offers a model [6] that uses deep learning and neural network methods to detect malignant parts of the lung; the model has a classification accuracy of around 90%, but it fails to determine the kind and type of cancer sickness. The author [7] proposes a model that uses a support vector machine to detect benign cancerous and non-cancerous images from CT scans, with an accuracy of 83 percent. The fractal features acquired from the Brownian motion model are used to categorize the objects. In model [8] identification of cancerous nodules in lungs from computed tomography scans, employs a variety of classifiers to detect the malignancy, including support vector machine classifiers, which enhance efficiency and hence lower error rate.

The author [9] described a method that uses the LIDC dataset to classify cancerous nodules in lungs according to their size, which ranges from 3mm to 10mm. Methods such as Random Forest and K-Nearest Neighbor in Machine Learning are used in the system. to achieve an accuracy of 82 percent in categorization. To categorize cancerous and benign pictures, a Deep CNN was trained using computed tomography scans from the dataset

LIDC. Using back propagation methods to extract picture information, the network achieves a sensitivity of 78.9%. Using CT scans, the author [11] developed a categorization model based on principal component analysis that achieves an accuracy of roughly 90%. A lung organ is used in the model. As a first step, segmentation of lung nodule is performed, followed by categorization of malignant and non-cancerous nodules. In the final phase, we'll look at malignant photos. The technology detects the malignancy of illness in its early stages [12] by analyzing the data by enduring various stages of the illness. Preprocessing and detection are the first steps in the detecting phase. Support vector machine and fuzzy logic are used in segmentation to increase classification accuracy. The classifier recognizes and categorizes pictures as benign or harmful based on their degree intensities.

Lung segmentation in CT images was done employing a CNN [13] that utilized deep learning techniques. Because lung cancer scans show varying degrees of opacities in the region of interest, the radiologist faces a difficult problem in identifying malignancy. The deep CNN model can help with this task. This is a texture-based issue that uses 42 CT pictures with high and low levels of malignancy. [14] To categorize lung pictures, machine learning approaches are used. Deep learning approaches can help to improve classification accuracy, allowing for the categorization of malignant and non-cancerous images. Different classifiers, such as SVM's and decision trees, were used in the research [15]. Different classifiers were used in the study [15], including decision trees and support vector machines, because they give greater classification accuracy. Large data input photos at the network model's input can boost classification accuracy even further. The model has a 94 percent accuracy when using a Convolutional neural network classifier, and an 86 percent accuracy when using an SVM classifier. In comparison to these classification results, CNN outperforms the Support Vector Machine classifier.

The network-based hybrid segmentation CNN [16] is a tool for training CNN models with both 2D and 3D data. This model performs well, with an accuracy of 88 percent, sensitivity of 87.2 percent, and precision of 90.9 percent. The author suggests using a Convolutional Neural Network [17] to reduce false positives and improve sensitivity in detecting lung cancer illnesses from CT scans. It was possible to reach a classification accuracy of 91.23 percent. Using a deep neural network [18], the suggested technique improves accuracy by 97 percent and so minimizes time sophistication with increased accuracy by applying MobileNet. According to the literature study, numerous scientists employed a variety of strategies for classifying lung nodules in order to locate malignant and benign pictures that may be used to predict and diagnose lung cancer in its early stages. CNN and its deep learning features are clearly one of the most potent techniques for classifying malignant photos, as evidenced by the review. Deep

Convolutional Neural Networks are formed when a Convolutional neural network uses deep learning techniques to classify malignant pictures (DCNN). To do additional calculations, Deep CNN employs several hidden layers, Convolutional layers, SoftMax layers, and fully connected layers. Because it utilizes several hidden layers, Deep CNN performs the classification operation effectively and takes more time to compute. The main functionalities of DCNN are feature extraction and classification.

III. METHODOLOGY USED

A. Convolutional Neural Network (CNN)

A Convolutional Neural Network (CNN) is a type of feed forward neural network inspired by biological visual system models [15], in which individual neurons are lined in such a way that they respond to overlapping regions in its receptive field and continues to be reliable with modern perceptions of image system structure [21]. Translational invariance is achieved when neurons with the same parameters are applied to overlapping portions of the previous layer at various places.
This makes it possible for CNNs to detect objects in their receptive field regardless of their size, location, orientation, or other visual features. In addition, as compared to fully connected neural networks, CNNs have less constrained connectivity, which reduces the computational requirements of training [26]. The figure depicts the architecture of a convolutional neural network. 1 is a multi-layered feed-forward neural network that is created by stacking multiple hidden layers on top of one another in a sequential order. Convolutional neural networks may learn hierarchical features because to their sequential construction. Convolutional layers are usually followed by activation layers, with some of them being followed by pooling layers.

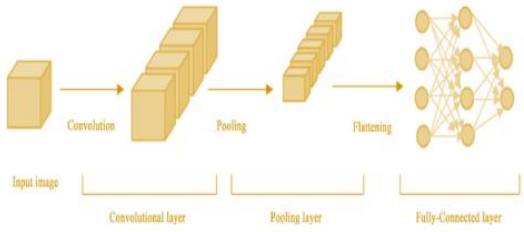

Figure 1: Architecture of CNN

The basic components of the CNN structure are shown in figure-1, which consist of 3 main layers: input, convolutional, pooling, and completely-linked.

The Convolutional layer- This layer combines input photos of a selected size, which can be appropriate for network training, with filters or convolutional kernels to produce function maps. These filters on this layer had been changed approximately in the dimensions.

Pooling layer- The reason behind this layer is to reduce the dimensions of the matrix and minimise the parameters, subsequently down sampling the characteristic maps of the Convolutional layer A sliding filter across the output of the Convolutional layer is used to calculate the most common or weighted average.

Layer that is completely linked - The motive of this deposit is to locate and label the pixel that arise from the preceding two layers. This accretion makes use of the SoftMax layer to become aware of the possibilities of values between 0 and 1 because it makes use of the SoftMax layer to determine the likelihood of values among 0 and 1. The Batch normalisation is likewise used to growth the schooling price and reduce overfitting.

Deep CNN can come across two kinds of lung most cancers: non-small cellular lung most cancers and small mobile lung most cancers. The primary class provides pre-processing sports important for DCNN to train and analyze photographs and extract functions. The second one category sorts via the CT scans and determines if the nodule is benign or malignant.

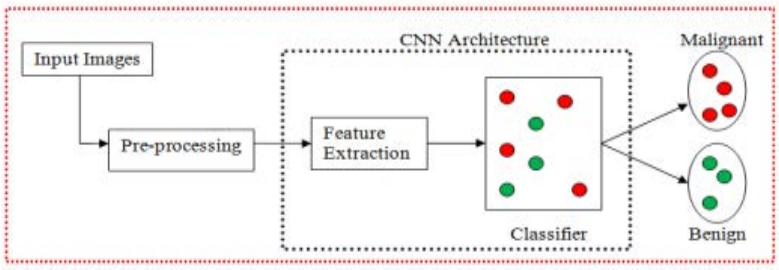

Fig.2. DCNN for lung cancer nodule identification.

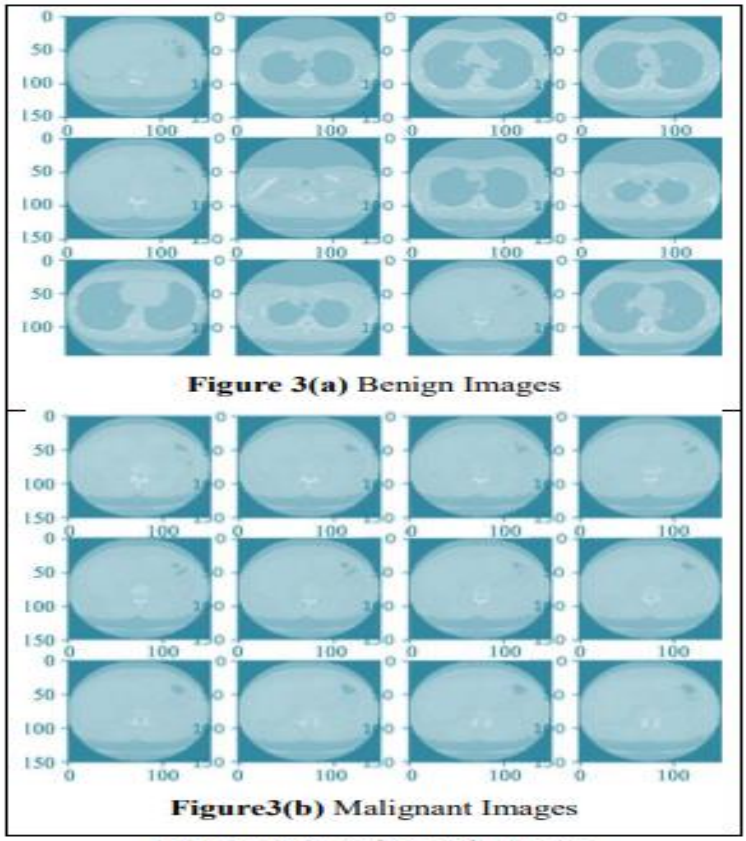

Figure 3(a) Benign Images

Figure3(b) Malignant Images

Figure.3 Experimental Images

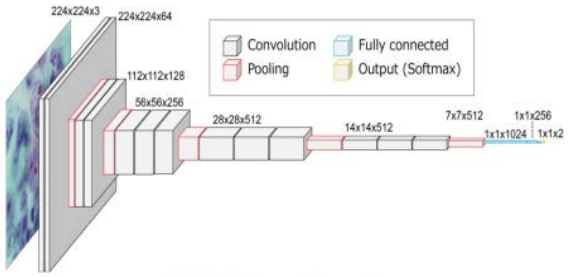

Fig.4. Architecture of Deep CNN

B. Training a deep convolutional neural network

The Deep CNN is skilled with 256x256x3 CT snap shots the use of returned-propagation methods. its miles divided into phases, education and trying out. DCNNs are educated the use of the CT scans in the first segment, with 900 photographs utilised Train the network for lung cancer classification.

During the checking out process, the community is given an unknown photo to assess as cancerous or non-cancerous.

by way of converting the community parameters so that it may take DICOM pics, images are educated and evaluated within the DICOM layout for minimal lack of features. The counseled planned community accuracy may be executed by using suitable evaluation.

C. Performance Measure parameters:

Accuracy, Loss, and Computation Time are performance evaluation metrics that may be used to assess a clinical photo's performance. When analyzing a model, accuracy is a crucial overall performance metric statistic to recollect. It reports the number of pixels from the given photograph that had been effectively categorized.

Loss Function: Loss, as determined by Loss, can predict the neural network's mistake. Another network performance measure parameter is this one.

Computation Time: How long it takes a method to finish its calculations or movements. It takes less time to technique a simple process than it does to manner a complicated technique, which takes longer to compute.

IV. Outputs and Discussions:

The Lung photograph Database Consortium's (LIDC-IDRI) photo series is a worldwide dataset.

a diagnostic and assessment tool for lung cancer it's made of 1018 DICOM-formatted CT scans.

The actual pictures are 512 512 pixels in length, but due to the fact schooling massive images in DCNN is tough, preprocessed photos have been utilized as a substitute.

To make the images extra community-pleasant, reduce their size. As a result, education and trying out photos are segregated.

comparing the community for correct photo type into malignant and non-cancerous pictures and helping in order to diagnose the patient early on [5][6].

The Deep CNN model is fed the input pix from the furnished dataset, that's skilled the usage of ninety% of the training images. Following education, the model is evaluated with

10% of the same dataset's testing photograph dataset. The photos are fed into a network model that classifies them as cancerous or non-cancerous.

TABLE.1 (a) DCNN Results

Resultant Curves of Deep CNN for 900 CT Images (A)		
Epoch	*Loss*	*Accuracy%*
1	0.8171	48.44
13	0.0336	100
25	0.0108	100
38	0.0091	100
50	0.0051	100
63	0.0033	100
75	0.0037	100
88	0.0024	100
100	0.0028	100
113	0.0019	100
125	0.0023	100
138	0.0015	100
150	0.0019	100
163	0.0013	100
175	0.0016	100
188	0.0011	100
200	0.0014	100
213	0.0014	100
225	0.0010	100
238	0.0013	100
250	0.0009	100

records on computing time, loss, and accuracy received from empirical work on a CT image dataset are shown within the table. b (c)

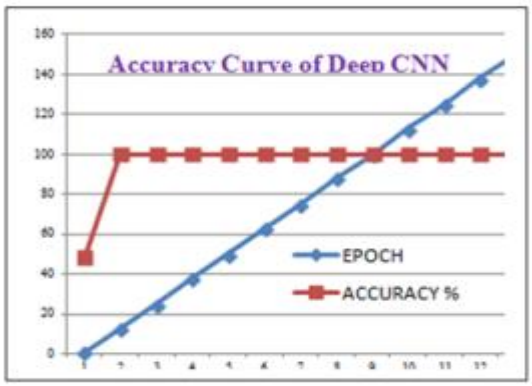

Figure.5 Epoch Verses Accuracy Curve

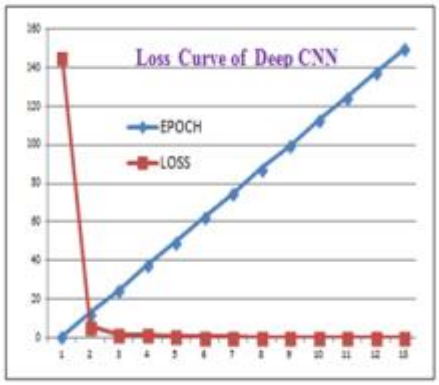

Figure.6 Epoch verses Loss Curve

To familiarize oneself with lung cancer, we used MATLAB 2018b to implement lung nodule class, and the dataset used for education and trying out became obtained from LIDC-IDRI. The pictures are fed into a network version that may locate and distinguish between malignant (Malignant snap shots) and non-cancerous (non-Cancerous pics) pics (Benign photographs). As may be seen from the results, type accuracy improves as computation time will increase, minimizing the proportion of loss as validated in the output graphs above.

With a computation time of 45,141 seconds, on a single CPU workstation, DCNN achieves 100 percent accuracy, which is higher than previous research articles [19][20]. For training and assessment, 900 CT images were used in this study, which is a bigger number than in previous studies [21][22].

Accuracy (%)	Year	Citation
78.9	2017	[10]
82	2016	[9]
83.11	2016	[7]
84.6	2016	[5]
90	2011	[2]
90	2016	[6]
90	2017	[11]
90	2019	[16]
91.23	2019	[17]
94	2017	[15]
94	2018	[1]
97	2016	[19]
97	2019	[18]
98	2014	[20]

Figure.15 Comparison of Accuracy from Literature Review

Table. Three depicts the accuracy % stage from the numerous papers inside the literature assessment, with graphical illustration in figure.15, and figure.14 compares the accuracy of previous publications and the counseled method. This model changed into created the use of a computer with a 2.20 GHz Intel center i3-2330M CPU, four GB RAM, and a sixty-four-bit home windows 10 working system. As a result, categorization accuracy has increased, surpassing [19] [20].

CONCLUSION AND SCOPE FOR FUTURE WORK

In our study, deep Convolutional neural networks were used to classify CT images of lung nodules into carcinogenic (malignant) and non-carcinogenic (benign) categories. Preprocessing was done prior to inserting input CT scan images to the network model to verify that the images were of comparable size and format. The dataset that we used in our research is part of the IQ-OTHNCCD dataset. As a result, we attained a precision of 100 percent, which is superior to the results of earlier study articles. The tests could be repeated using Deep CNN architecture for various forms of cancer in the future.

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Smart Parking Using IoT

Pappu Mohan Sai[1], Pavan Kumar C[2], Prathik R Naidu[3], Noel John Correya[4], Prof.Keerthana.P[5]

School of Computer Science Engineering, Reva University, Bangalore,India

[1]*mohansaipappu@gmail.com*

[2]*pavankumarc1997@gmail.com*

[3]*prateekrnaidu@gmail.com*

[4]*noelcorreya86@gmail.com*

[5]*keerthana.p@reva.edu.in*

Abstract

The world's population is rapidly increasing at a rate of 1.09 percent per year, resulting in a slew of issues that have a negative impact on our civilization. In the recent decade, most urban areas have seen a substantial increase in automotive ownership. These issues are not only a personal issue, but also a global issue encompassing air pollution, traffic congestion, and the waste of natural resources like petroleum and, most crucially, time. Finding a parking spot for their vehicle in congested areas might be tough. This Smart parking system proposal incorporates an onsite Internet of Things (IoT) module that offers real-time data and tracks vehicle flow into and out of the parking lot. The algorithm finds the most suitable parking location. The goal of this project, Smart parking system with IoT and disciplined parking mechanism, is to shorten the time it takes to find a parking spot for your car. This approach can be used to find out about available parking spots. The algorithm generates the best parking spot solution. This approach can be used to determine the available parking space. This project also includes a method to assist drivers in parking their vehicles in a disciplined manner. This project also includes a method to assist drivers in parking their vehicles in a disciplined manner.

Keywords – Arduino, ultrasonic sensor, cloud server, IoT.

1. INTRODUCTION

The vehicle business has seen a phenomenal increase in production in today's world's rising civilization. Finding parking spots for vehicles has become a difficult undertaking as a result of traffic congestion. The IoT-enabled Disciplined parking system with smart parking system is an automated system that allows a user to locate an available parking spot. This will allow the user to quickly locate a parking spot without having to seek for one because the user will be aware of each status of the parking spot in a large parking spot. This method is intended for mall parking lots, as well as ordinary public parking lots in metropolitan areas. This automated system uses ultrasonic sensors to determine the availability of an open place.

Device with ultrasonic sensors **Cloud Server** **Web Application**

Fig (1): Working model of Smart Parking Using IoT

As an illustration of this pattern, we'll build a smart parking system. The graphic shows a higher-level view of every component that make up this system. Arduino device is the first component that checks the state of parking spots using an ultrasonic sensor and communicates the data to a server via an HTTP request. The second component is a server with services for storing parking spot data and an interface service that displays the number of available parking spots.

We can revolutionise the way we find a parking spot for our cars by utilising Internet of Things technologies and web applications. This relieves stress on the driver while also saving time. Smart City Development can benefit from this type of parking place help solution. Before we started working on this project, we conducted a poll to get information from people who drive on a regular basis about the challenges they have when it comes to parking their cars.

The Internet of Things (IoT) is a network in which all physical items are connected to the internet and exchange data via network devices or routers. IoT systems can be set to respond to predetermined conditions. It has become a popular tool for smart city upgrades. As a result, the project employs IoT, in which sensor data is uploaded to the cloud. This information is made available to consumers via a web application, allowing them to pre-book a parking spot or locate an empty one. The back end of this web application is written in Java script, while the front end is written in HTML.

The survey's primary questions were:

1. How often did they encounter difficulty while parking?
2. Major problems that users have when trying to get a parking spot
3. Would the users use an application to help them with parking?

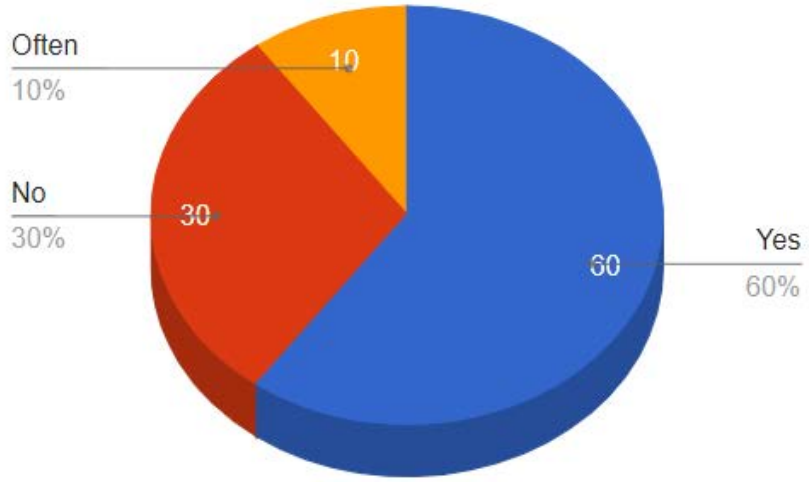

Fig (2): Pie chart shoes about the survey taken

2. LITERATURE SURVEY

Smart Parking systems gather the necessary information about the available parking space in a user's nearby area and process it in real-time to arrange vehicles in those slots. It involves the use of less expensive sensors, real-time data collection, and a web application that allows people to park and accurately estimate where the user can find the spot. [1]

Infrared Radiation (IR) sensor and Internet of Things technology are integrated into a smart car parking system (IoT). It allows the user to locate the nearest parking spot and displays the number of available spaces in the closest parking zone.[2]

Smart parking system minimises the emissions of C02 by removing the necessity for the people to look for a parking area in a crowded place. It also enables better management of parking spaces. Smart parking addresses one of the most challenging parts of city driving: finding open parking spaces and avoiding illegal parking. Three modules make up the Smart Parking System: monitoring, control, and a display unit.[3]

In addition to the aforementioned three modules, it will contain a centralised system that will maintain a parking space database as well as an SMS gateway. The ultrasonic sensors detect available parking spaces and

provide the information to the control unit. The sensor not only recognises the vehicle but also provides information such as the amount of time it has been parked.[4]

Smart City Application: The Operating systems such as iOS and android Smart Parking System makes use of a wireless sensor nodes to gather data from various locations. Sensors exchange information and receive data from their surroundings. The information gathered from the environment is sent to the network environment.[5]

The control units process the information before sending it to the central supervisory system. The controller uses UDP to communicate with the centralised supervisory system about available parking spaces. It then sends information to the user's phone, such as the allotted parking place, the amount of time spent parked, and directions [6].

Smart City Application: The Operating systems such as iOS and android Smart Parking System makes use of a wireless sensor nodes to gather data from various locations. Sensors exchange information and receive data from their surroundings. The information gathered from the environment is sent to the network environment.[7]

The project's goal is to create a cutting-edge smart parking system using IoT technologies. The gadgets can be turned on and off remotely using a mobile smartphone (Wi-Fi). In the realm of electronics, automation is the most commonly misspelt term. The desire for automation prompted numerous technological revolutions. Because of its user-friendliness, these were given greater weight than other technologies. These can be used to replace old switches in the home that cause sparks and, in some cases, fires. An innovative automated system was designed to monitor the state of parking places, taking into account the benefits of Wi-Fi. Wi-Fi (short for Wireless Fidelity) is a wireless technology that transmits data across the air using radio frequency. [8]

3. METHODOLOGY

The following stages will help you understand how the web application works in its entirety:

Step 1: It's critical to know the customer's information before offering any service, both for security and to identify the vehicle's owner. For booking purposes, the user's credentials are entered. The user's name and phone number are included in the credentials.

Step 2: This is one of the most important processes in the web application's back end. The user will get access to the parking layout as well as real-time information on available places. If an empty parking place disappears. The user will receive an automatic message directing them to the nearby parking space with an empty spot.

Step 3: If a slot for the user's vehicle is open, a screen appears for booking, it allows the user to select a nearby location. that is convenient for them and book it. When a parking spot for a car is reserved, an automatic timer begins to calculate the length of time the vehicle will be parked**.**

Step 4: When a customer decides to leave the parking lot, the amount of time they parked their car is noted, and generation of a bill takes place, which has to be paid when the customer leaves.

Step 5: When the user wants to leave after the car is parked, an online payment site is opened, allowing the user to pay for the time they spent in the space using various online payable method.

The complete working and methodology of Three steps are:

1. The Circuit connection and hardware implementation.

2. The Software part including Algorithm and code analysis.

3. The disciplined parking mechanism.

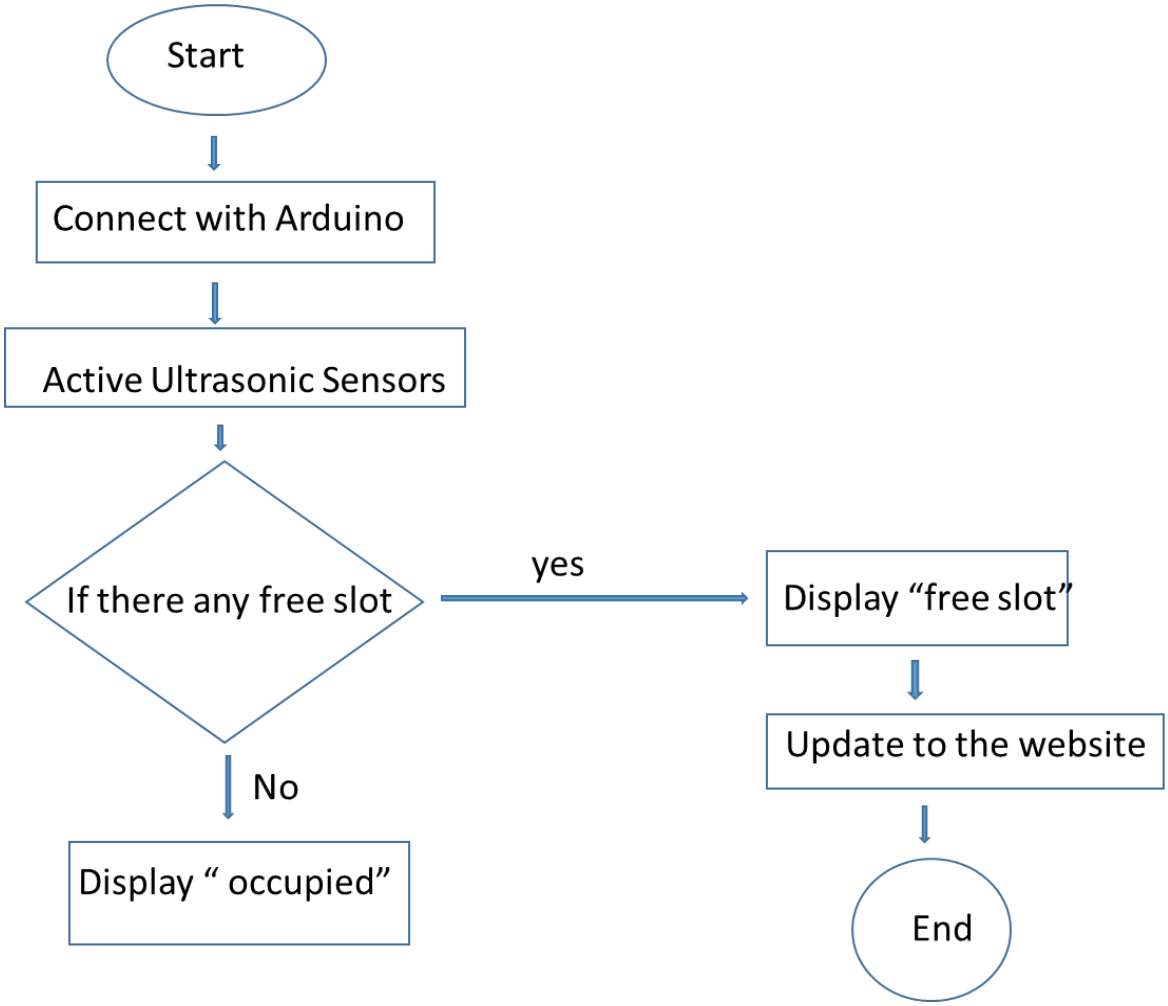

Fig (4): This flowchart shows how the smart parking system works

4. SYSTEM REQUIREMETS

Hardware Requirements:

- **Ultrasonic Range meter (HC-SR04)**: The HC-SR04 Ultrasonic Distance Sensor is made up of two ultrasonic transducers at its heart. The one serves as a transmitter, converting electrical signals into ultrasonic sound pulses at a frequency of 40 KHz. The transmitted pulses are detected by the receiver.

If it receives them, it generates an output pulse whose width can be used to calculate the pulse's travel distance.

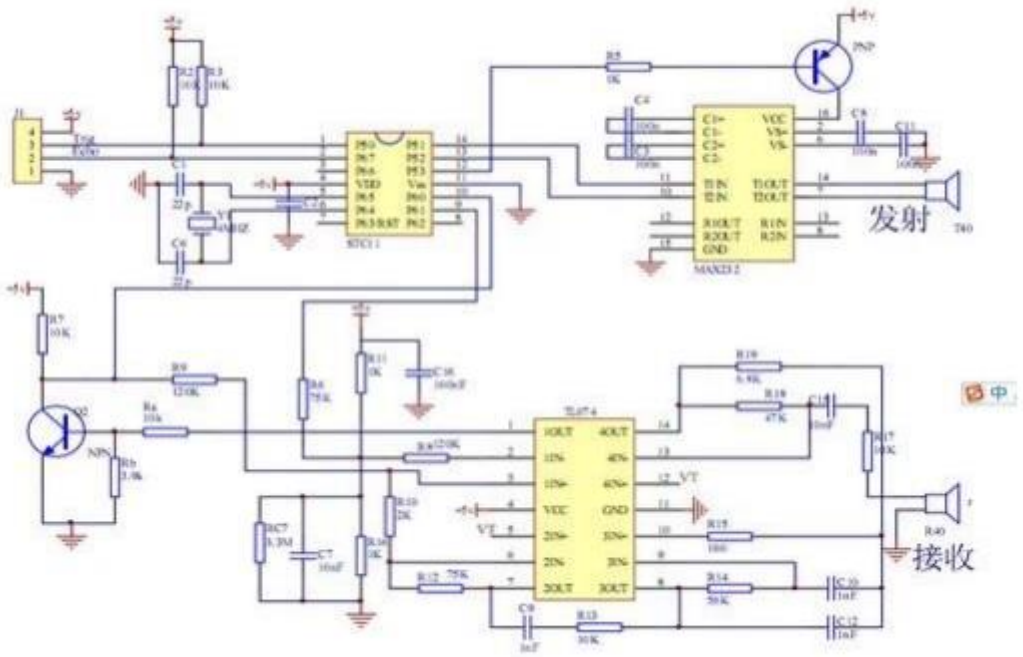

Fig (5): Internal circuit of ultrasonic sensor

The pin specifications of the HC-SR04 ultrasonic sensor:

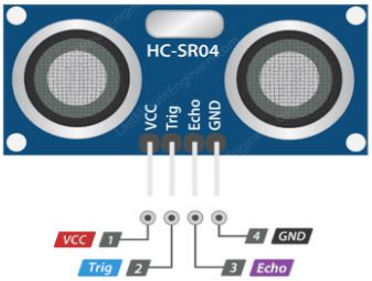

Fig (6): Pin Specification

- **Node MCU ESP 8266**: The Node Micro Controller Unit (MCU) is an open source, interactive, programmable, low-cost, smart Wi-Fi enabled gadget. The Node MCU's primary features are given below. When a pulse of at least 10 S (10 microseconds) is applied to the Trigger pin, everything begins. The sensor responds by emitting an eight-pulse sound burst at 40 KHz. This 8-pulse pattern distinguishes the device's "ultrasonic signature," allowing the receiver to distinguish the transmitted pattern from ambient ultrasonic noise.

- **LCD Display:** An LCD character display is a special form of display that can only display single ASCII characters of a specific size. We can create a text using these individual characters.

When we look at the display more closely, we can see little rectangular sections made up of a 588-pixel grid. We can construct characters within each grid since each pixel can light up individually.

The size of the LCD is determined by the number of rectangular regions. The 162 LCD is the most popular, with two rows of 16 rectangular regions or characters. There are various sizes, such as 161, 164, and 204, but they all operate on the same concept. These LCDs can also have a variety of backdrop and text colours.

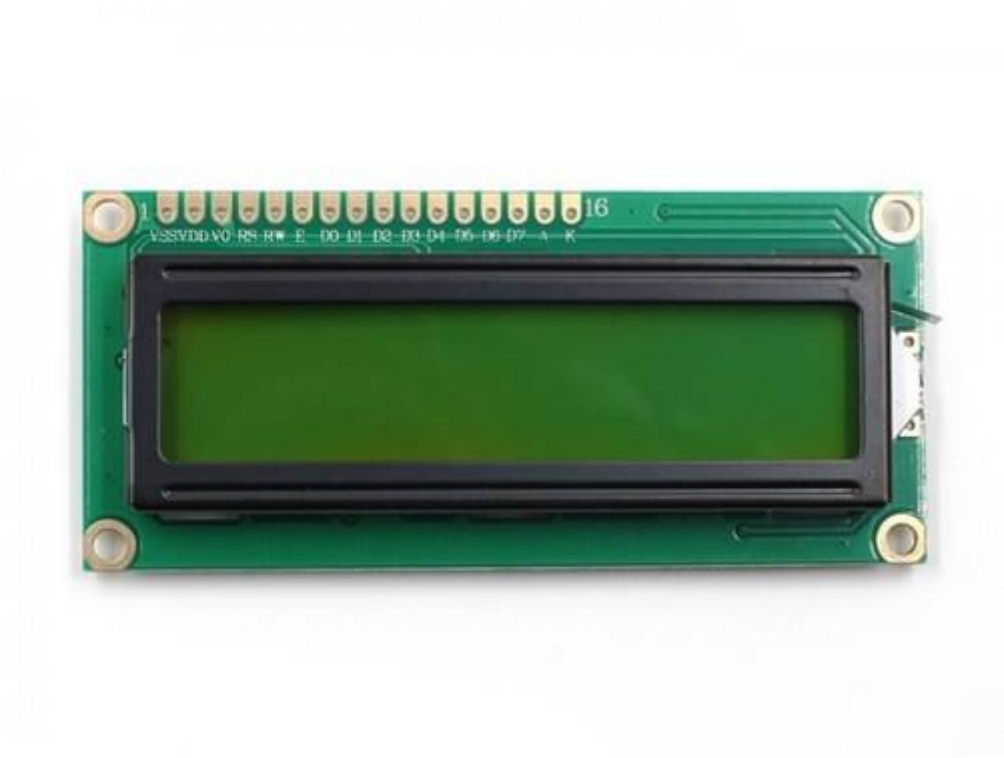

Fig (7): LCD Display

- **I2C module:** I2C is a single-ended, synchronous, multi slave, multi master packet switched serial bus. Multiple chips can be connected to the same bus, for example. Serial Data Line (SDA) and Serial Clock Line (SCL), both bidirectional open collector or open drain lines, are pulled up with resistors in I2C.
- **Puff Board:** This is a simple circuit that allows you to turn off the glowing LED with a puff. To detect your puff, a condenser mic (M1) is employed. When the push button S1 is pressed, the latching pair of transistors Q2 and Q3 are triggered, causing the LED to illuminate. The LED is still in this state. The sound pressure is turned into a voltage signal at the condenser mic's output when you puff on it. The transistor Q1 will amplify this voltage signal. Because the Q1's collector is connected to the latching

pair's emitter, the pair will stop conducting when a signal from the condenser mic is detected due to puffing, and the LED will turn off.

- **Jumper Cables:** Jumper cables, also known as booster cables or jump leads, are a pair of insulated wires with alligator clips on either end that are used to connect the malfunctioning equipment/vehicle to an auxiliary source, such as another vehicle or equipment with the same system voltage or a different battery.

Software Requirements:

- **Arduino IDE**: The Arduino Software (IDE) includes a text editor for writing code, a message box, a text console, a toolbar with buttons for basic functions, and a series of menus. It communicates with the Arduino hardware and uploads applications to it.

Sketches are projects created with the Arduino that are written in a stripped-down version of C++ (a lot of C++ features are not provided). There are a number of device-specific libraries (e.g., changing pin modes, output data on pins, reading analogue values, and timers) since programming a microcontroller differs from programming a computer. Users who believe Arduino is programmed in an "Arduino language" may be confused by this. The Arduino, on the other hand, is written in C++. It simply makes use of device-specific libraries.

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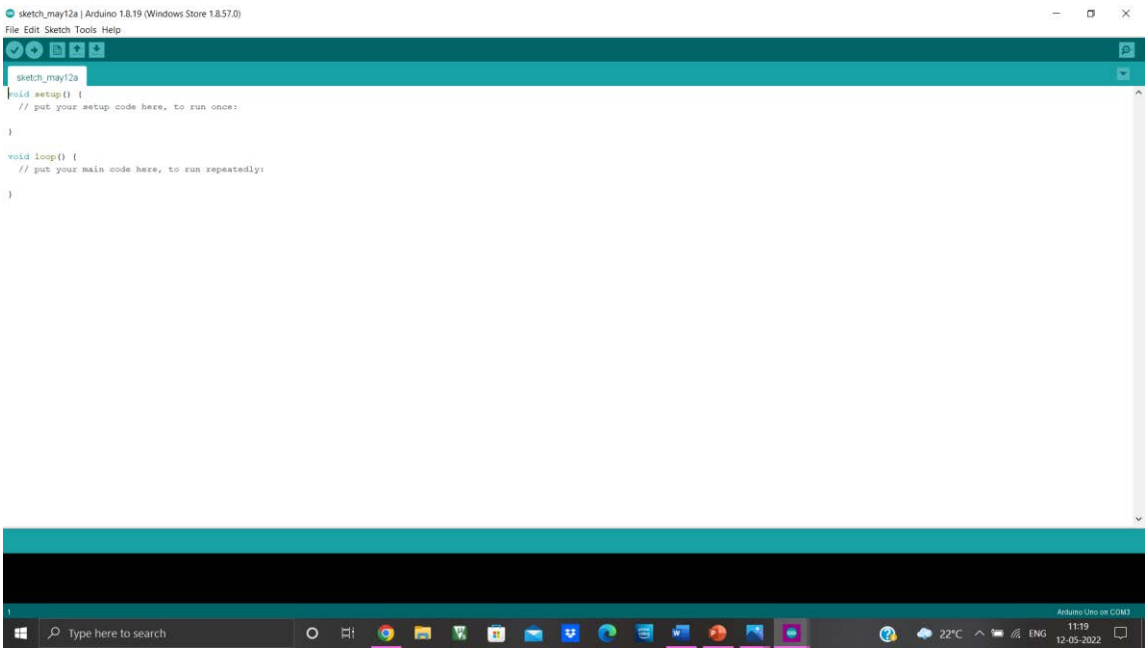


Fig (8): Arduino IDE platform

- **Thing Speak Cloud Platform:** ThingSpeakTM is a cloud-based IoT analytics tool that lets you aggregate, visualize, and analyses live data streams. ThingSpeak delivers real-time representations of data sent to the platform by your devices.

  Key Features of ThingSpeak:

  ThingSpeak is a cloud-based service that allows you to gather, visualize, and analyses live data streams. ThingSpeak has a number of significant features, including the capacity to:

- Configure popular IoT protocols to deliver data to ThingSpeak with ease.
- Real-time visualization of sensor data
- On-demand data aggregation from third-party sources.
- Make sense of your IoT data with the help of MATLAB.
- Automate your IoT analytics based on schedules or occurrences.
- Create IoT systems without having to set up servers or write web software.
- Use third-party services like Twilio® or Twitter® to automatically act on your data and communicate.

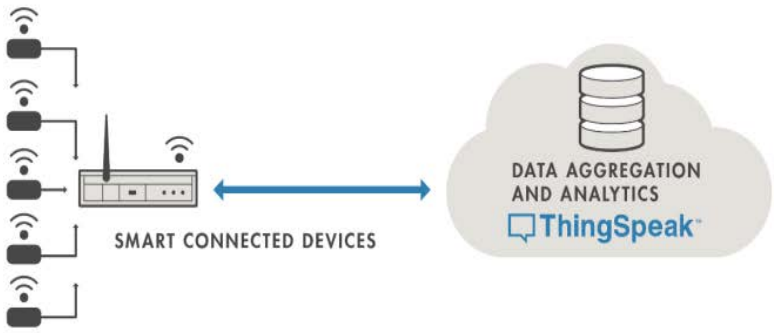


Fig (9): ThingSpeak Cloud Platform

5. SYSTEM ARCHITECTURE

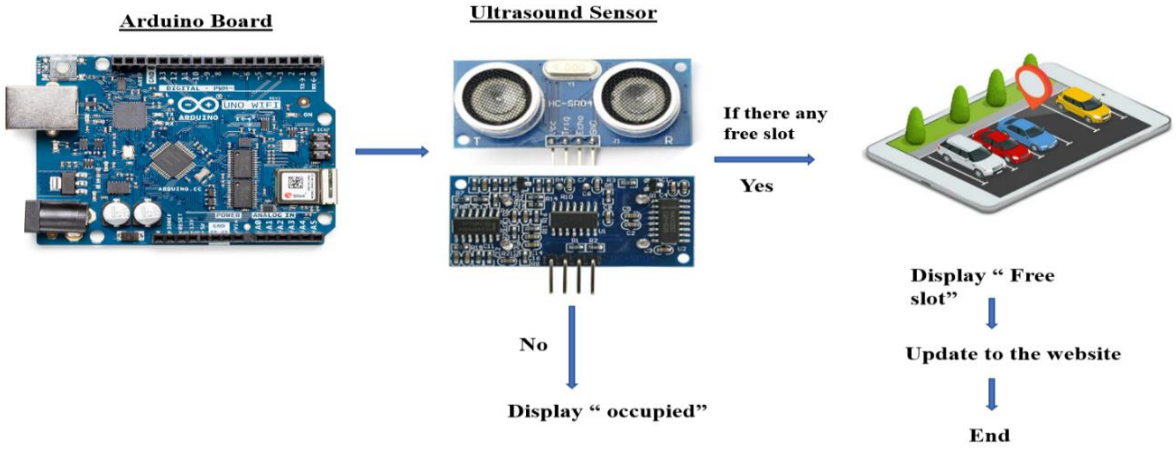


Fig (10)

6. HARDWARE IMPLEMENTATION

PINS: Vcc, Trig, Echo, and Ground are the four terminals on the HC-SR04.

Each of these terminals have a special purpose. The Vcc terminal is used to provide power for the sensor so that it can function like it is programmed to. The ground terminal provides the necessary ground connection required for the circuit. The input pin is connected to trigger ((Trig) which is used to start a measurement by emitting ultrasonic pulses for 10 seconds. Finally, the echo pin is an output pin that is set to go high for a selected amount of time, which is equal to the amount of time it takes for the wave to return to bounce back and return to the sensor.

7. RESULT AND ANALASIS

Formula to calculate the distance: Distance = Duration*0.034/2.

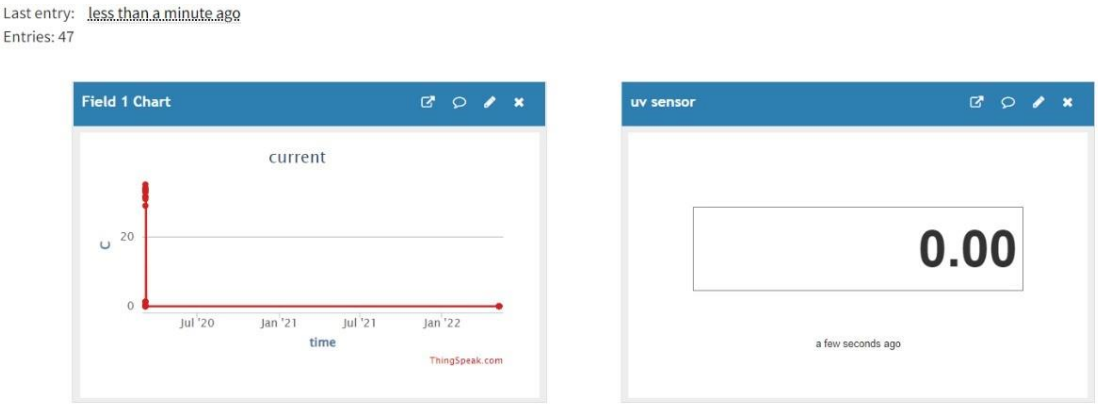


Fig (11): output shows that the object is not detected and the parking spot is empty

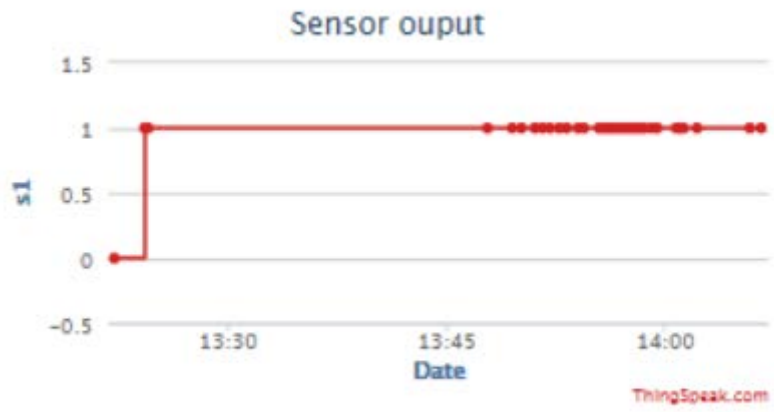
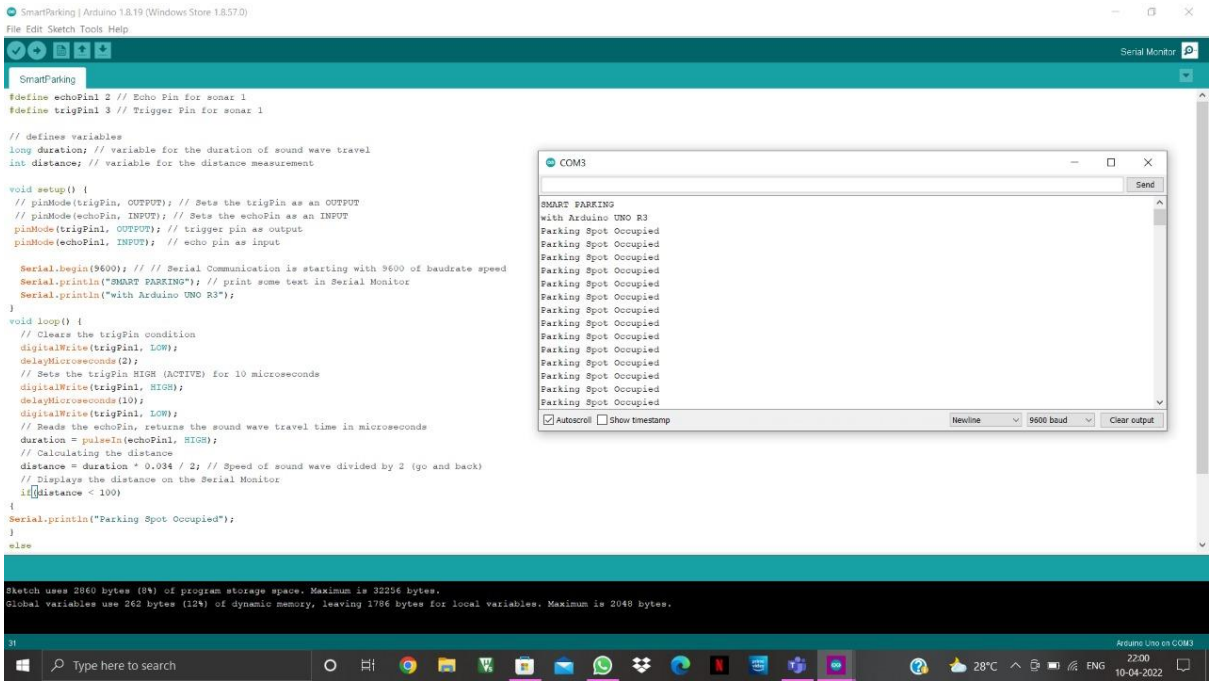


Fig (12): parking spot occupied

Code Output :



8. CONCLUSIONS

The Advanced Parking Spot Assistance System makes metropolitan living, transportation portability, and ecological manageability simpler. It is utilized in activities to further develop efficiency and administration levels. It additionally gets a good deal on running expenses while expanding pay and office esteem. Conventional help channels, for example, tollgates and stopping specialists have affected the proposed approach. It utilizes an ultrasonic sensor, a Node MCU with an ESP8266 Wi-Fi module ready, and a cloud server. The Internet of Things joins equipment, programming, and organization availability to permit things to be identified and controlled somewhat over existing organizations. Clients can screen accessible and inaccessible parking spaces, bringing about expanded effectiveness, exactness, and financial increase.

The fundamental commitment of this study is to present the main stopping problem Finding an unfilled space — and propose an answer. Ultrasonic sensor can be utilized both for
parking spot location and inappropriate stopping discovery. The proposed engineering for stopping recognition framework and the web application would diminish scanning time for empty spaces and decrease occasions of single vehicles inappropriately left across two spaces. The web application permits the client to get to accessible parking spots and book them, in this way diminishing the time taken. Future examination could look at the reconciliation of various stopping scenes into a solitary application.

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A VISION DISABLED INDIVIDUAL'S ASSISTIVE MECHANISM

Kirana J P, Keerthi Reddy B V, Hariprita K S, Gagana V, Priyanka Bharti

School of Computer Science and Engineering, REVA University

Bengaluru, India

Abstract—**Visually challenged people make up a sizable population segment, with estimates ranging from tens of millions to hundreds of millions worldwide. Integration into society is a major and ongoing goal for them. A considerable deal of effort has gone into ensuring a model of primary care. To facilitate visually impaired people in living a full life, many navigating system approaches have been introduced. Often, these systems are built with a particular goal in mind. Nonetheless, these solutions can significantly improve the mobility and safety of such individuals. The plan establishes a platform based on vision recognizing real-world items both indoors and outdoors in order to help people who are visually handicapped. The software is created with OpenCV library and Python functionalities and then ported to a laptop. YOLO is a novel way of object detection. The image is converted to a scanned image for further processing using the application for interpreting the contents. The output of the image detected is a scanned image, which then uses Tesseract OCR (Optical Character Recognition) software as an input, which converts the image to text, along with that we add road sign recognition for outdoor guidance while walking on the road. We use the TTS (Text to Speech) engine to translate text to speech after detecting texts and objects.**

Keywords—Deep learning, Object Detection, OpenCV, YOLO, Tesseract OCR, Road sign detection, TTS.

I. INTRODUCTION

Individuals who are visually impaired (VI) or blind have a lower quality of life since they are unable to sense the terrain and their surroundings. In their daily lives, they would require constant assistance and walking support systems. For decades, solutions have been introduced, and they are rapidly improving because of technological evolution and integration. An outsized variety of help aids are deployed in the real world whereas other ideas remained as analysis concepts.

The event of progressive steering the sophisticated image acquisition and computer vision techniques, as well as device and unit processor speed performance, are all linked to systems that assist visually impaired people. Regardless of the terminology used, the software must work in real-time, with swift judgments, because speed is crucial when taking action.

Obtaining the simplest answer is essentially a trade-off between the software component's performance and the complexity of the solution possibilities of hardware. It is necessary to standardize the parameters to the greatest extent possible. One of the goals of the aided system during a visually impaired person's indoor movement is to identify and distinguish objects or impediments, which is followed by an audio alert.

This system's planned vision module for image processing is an associate integrated with a portion of the system dedicated to serving blind and visually impaired folks. Furthermore, regardless of the integrated platform, the suggested system could be used outside of the shell. Throughout experimentation and iterative optimization, the image decision to develop has been designed, developed, and proven to be effective. The module refers to the notion of creating a high-performance gadget that is also cost-effective when used properly. The module employs disruptive technologies to allow for changes and the addition of new features.

II. OBJECTIVE AND SCOPE

1. Identify, recognize and produce valuable captions for a certain picture by means of Deep Learning Techniques.
2. Identify the object's position in the frame with the object label/object name.
3. Programming both the objects detected and the position of the objects to a speech output using text-to-speech convert.
4. Analyzing the written text and converting it into speech format.
5. This paper's one of the objectives is to describe a sign detection approach that can convey regions of interest to a classifier.
6. Sign recognition is been said in voice format so that a blind person will have no difficulties in understanding the sign.

III. LITERATURE REVIEW

More than a quarter of the world's 36 million blind individuals live in India. One of the most biggest obstacles that blind institutions face these days is educating the blind to avoid states within their total number. Despite the fact that many schools employ Braille to combat, it is quite unapproachable. According to India's Braille Literacy Statistics, only 10 percent of the country's twelve million blind people, know Braille. The challenges faced by the blind and visually impaired to browse and learn without the utilization of Braille is one of the most significant issues they face. As a result, The approach presented by

Megha P Arakeri, Keerthana N S, Madhura M, Anusha Sankar, and Tazeen Munnavar is to create a low-cost gadget that utilizes ai algorithms to browse any words in various orientations and illumination circumstances surrounding the user. The technology uses a Raspberry Pi and an appropriate webcam, to gather stuff all across people who are blind and read it aloud in their native language to them. The device has a sensor that alerts the user to the closeness of the closest item at a neutral position and simultaneously calculates the number of objects in its view. Methods for image segmentation, algorithms, and voice synthesizer are all used in the system. Eighty-four percent efficiency was found when optical character recognition and visual perception algorithms were integrated. [1]

According to Effy Maria, Ani R, Sakkaravarthy V, and J Jameema Joyce of the World Health Organization, 285 million individuals worldwide are vision-impaired out of a population of 7.4 billion, and they've been experiencing difficulty managing their everyday routines. They have proposed smart spectacles for blind people that can identify text and generate an audio output as a means of assisting them. It allows visually challenged people to scan any textual content using their voices. Using the device's built-in camera, the text image from the written text is collected, and the obtained picture is examined using Tesseract-OCR (Optical Character Recognition). eSpeak, a simple open-source speech synthesizer, is then used to convert the detected text to voice. Ultimately, by applying the TTS technique, the headphones generate synthesized speech. The primary objective for implementation in this project is Raspberry Pi which serves as a gateway between the sensors, camera, and image processing results, as well as performing operations to control peripheral units (USB, Keyboard, etc.,). [2]

L. Tepelea et al.[4] explained how to help visually impaired people using a CNN-based correlation method. Given the large number of data that will be collected from images acquired. A visual processing unit must be included in the structure of systems that aid people with visual impairments, regardless of the version presented. It proposes a correlation method based on the usage of CNNs(cellular neural networks), which can enhance the options of supporting systems and give visually impaired persons additional information from their surroundings. The majority of the operations (calculations) in the suggested algorithm is been performed by parallel processing. As a result, the computing time will be reduced, and the computing time will not rise correspondingly as the template picture size increases.[3]

P Szolgay et al.[5], designed the portable system which was based on a smartphone but also incorporates the usage of external sensing modules. It covers visually challenged people's interior and outdoor mobility. The system's effectiveness has been demonstrated in tests, and it can be further enhanced with the advancement of Android-based portable devices. The research described a portable solution for assisting visually impaired people in both indoor and outdoor settings. It used a variety of sensors to detect obstructions and, with the help of GPS and a compass, lead them through their movements. A multicore Android smartphone serves as the central component of the system. Alternative sensory modules detect barriers and relay pertinent information to the main portion. The technology might also interact remotely to allow for distant monitoring. [4]

According to Ahmed Abdelgawad, Michael Trent, and Kumar Yelamarthi, smart gadgets have grown significantly more prevalent in our everyday lives in recent years. They're being implemented into houses, cars, buildings, and public areas. Furthermore, the IoT, (Internet of Things), is a technological revolution, that provides us all with new opportunities. To assist blind people, a variety of navigating systems have been designed. Despite this, none of these systems are linked to the Internet of Things. Their goal was to create a low-cost, low-power IoT navigation system for those who are blind. Their solution included a network of ultrasonic sensors installed on a waist belt that surveyed the scene, iBeacons that specifies the position, as well as a Raspberry Pi that processed the data. Ultrasonic sensors on the Raspberry Pi detected the obstructions and provided audible cues to the user via a Bluetooth headset. iBeacons were placed in a variety of locations, each with its own unique ID. There was a database in the cloud for all the iBeacons that were linked to the corresponding information, such as the address and data about the location. The ID of the iBeacon is detected by the Raspberry Pi and delivered it to the cloud, which then resends the information associated with the existing ID to the Raspberry Pi, which converts the textual content to speech and plays it to the user through a Bluetooth headset. Tests showed that the technology worked as a navigation assistant and was accurate within the minimum radius. [5]

A variety of machine vision has been created to assist the blind and visually handicapped. The viewers' movement causes all scene objects, whether static or non-static, to move. As a result, detecting moving objects with a moving observer is required. Yogesh H Dandawate and Sanket Khade have proposed a camera-based prototype system for assisting blind people in detecting impediments utilizing motion vectors in this context. To accomplish object detection, they gathered a collection of their indoor and outdoor environments and evaluated the light flow. Furthermore, they were able to recognize the items inside the zone of interest without the need for expensive depth cameras or sensors. The Raspberry Pi 2-B is the hardware used in the proposed project, and the object identification algorithms are implemented in MATLAB (for simulation reasons) and Python. [6].

IV. PROPOSED SYSTEM

For people with visual impairments, this system features a voice-assisted word-based device. The suggested framework includes a camera module, an image processing module, an optical character recognition module, the Yolo framework, and a text-to-speech module.

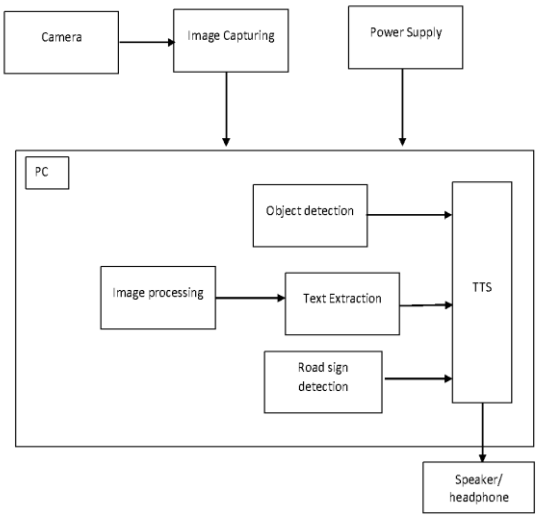

Figure 1. System Architecture

A. Image capturing

A Raspberry Pi camera with a 5mp resolution is used to capture the text picture at this step. In terms of shape and scale, the acquired image isn't perfect, nor in an acceptable state for text extraction data. As a result, the image-processing module is used to process the acquired picture first. The photograph was captured in jpg format.

B. Detection of object

Many artifacts are present in the captured shot. The JSON.parse library is used to identify all objects, although not all of them are interpreted, however, those with higher accuracy can be read.

C. Image processing

The image magic implementation is used to eliminate unnecessary noise in picture processing. Image magic is open-source and free software. Image magic consists of a variety of tools in which the proposed technique uses image sharpening and text washing. Image sharpening improves the difference between the image's bright and dark areas. Text cleaning is a technique for cleaning scanned documents in order to make the final picture more readable for OCR.

D. Text Extraction

The image magic program's output image is converted into textual or modifiable data in this stage. For this execution, we deployed the Tesseract OCR tool. The Tesseract OCR program detects textual content in the captured image after it has been analyzed. The results of the extraction of information are saved in the .txt format.

E. Sign detection

Sign classification includes RGB pictures of the traffic signboards. These RGB images are been preprocessed using multiple techniques, particularly shuffling, grey scaling, local histogram equalization, and normalization. To come up with further additional training data transfer image function is being employed which has rotation, sharing, and image translations. Using TensorFlow the information is being trained and tested.

F. Text - Speech converter

A voice synthesizer is employed in the synthesis of retrieved text into speech in this stage. For this procedure, we employed the Google speech synthesizer and the e-speak TTS engine. A speech synthesizer's output is audio or sound.

V. METHODOLOGY

Object Detection

The video has captured with the use of a camera that is then divided into a series of frames. Object detection has been accomplished with the use of CNN classifiers and text to audio conversion is done using pyttsx3.

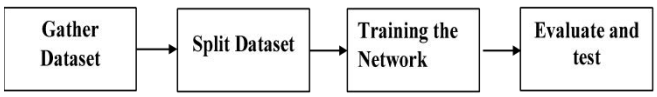

Figure 2. Deep learning steps

For the mobility of the person's body in the internal environment, the procedure picture capture > image processing > acoustic notification is repeated. The total processing time is calculated by adding the three processing cases together, and

this sets the acquisition rate for the picture frames input. This strategy must be quick enough to avoid any barriers in a timely manner.

The image processing approach is used to solve an issue with detecting a specific object, in this case, traffic signal recognition. We utilized the cv2 function from the OpenCV library.

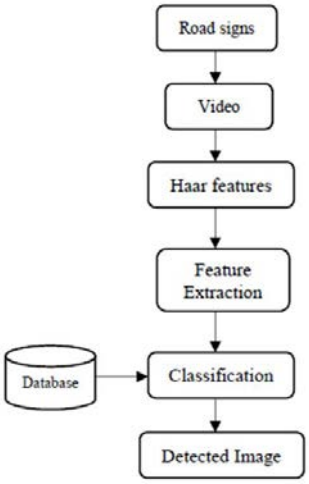

Figure 3. Object detection algorithm workflow

For the Python version, match the template that already exists in the library. The following design standards were addressed by the module:

1. The amount of time that could pass between two subsequent video frames, we strive to maintain every template's processing time as a minimum. The total processing time was increased as we used the method on several scales ought to be sufficiently little to allow real-time decisions.
2. Among each collected video frame is down sampled with diverse methods in the multiscale technique, resolution 5, 3, and 1 are the factors. If the source image's initial resolution is 960x1280 pixels, for example, down sampling with issue 3. As a consequence, three portraits with reduced resolution will be created with the following dimensions: 960 x 1280 pixels, 720 x 960 pixels, and 480x640 pixels. The template is then compared to each image source version that has now been scaled. Another factor to consider is the internal module parameter approach in relation to the size of road signs and source picture resolution. We must account for many processing times at each stage, beginning with image acquisition, module communication, and finishing with the trigger action to emit the auditory alarm, in order to have an overall evaluation. An auditory message is provided through headphones to the user once an object has been spotted. The audio message is, in its most basic form, additional or fewer than 1.2÷1.5s in length. Currently, this time span is used as a benchmark.

Text Recognition

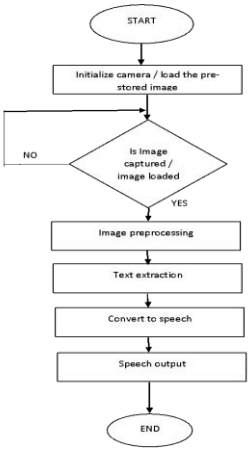

Figure 4. Text Recognition

Image Capturing: The first step is to capture an image from the document or book and thereafter the document or book is placed below the camera that facilitates capturing an image from the document or book. The camera used to capture an image is a PC camera.
Image pre-processing: It is the technique of removing undesirable noise from a photograph, by applying a suitable threshold to the image. It is used for correcting skew angles, sharpening images, thresholding, and segmentation.
Text extraction: In our project, Tesseract OCR is what we are using, an engine that is employed to extract the recognized text.
Text to speech: Once extracting the text, it is converted into a message. The text to speech converter synthesizer is employed to convert text into speech. Ultimately the speech output gets through.

Sign Recognition

Image Capturing: The first step is to capture an image from the road signboard.

Haar features: This may not accurately reflect the strategy, but with a large number of features in multiple stages, this technique will save burden in the later stages because the majority of windows and frames will be rejected only in the initial stages.

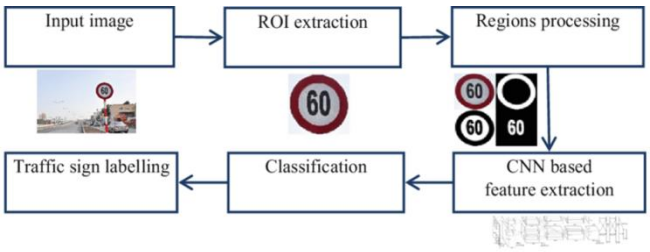

Figure 5. Sign Recognition

ROI extraction (Region Of Interest): It's a region of a picture. that all you have to do now is filter or operate in a way. The required segments from an image convert the RGB image to gray-scale, removes noise from the gray-scale image where a lot of unwanted edges need to be eliminated and a few of the sides have gaps in between that need to be closed.

Once a road sign is detected and identified, the traffic-road sign is labeled and the user receives an auditory message via headphones.

VI. Results and Discussion

The hardware implementation of this system is through using a custom-built spec that will include a camera and separate buttons on the sides for user inputs. The user will hear the output using a headphone set that is linked to the system. The software simulation is created using the same specific buttons. The initial interface shown on the screen when we execute the application is illustrated in Figure 6. Here are two buttons that allow the user to either load a previously shot image or live capture an image in the current environment. The third available option is the quit button, which is used to exit the interface.

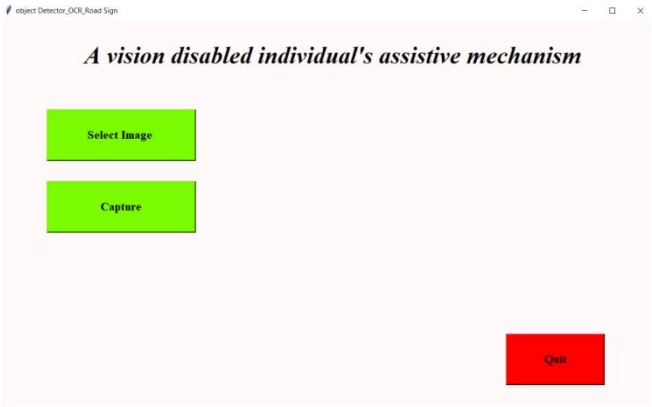

Figure 6. Initial interface

When the select image button is processed, user will be given the option of selecting a signboard image or an image with text from the appropriate folder. The selection interface is depicted in Figure 7.

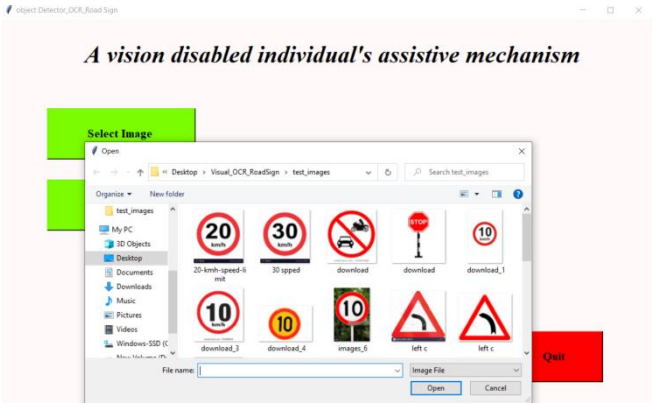

Figure 7. Selection layout

Following the selection of the needed image, three buttons will appear on the screen, each of which must be selected in relation to the image chosen by the user.

After clicking the relevant button, the image is pre-processed, and we see a textual output at the bottom of the window, as well as an audio output of the same text. Figures 8 and 9 show the analyzed text and sign, respectively.

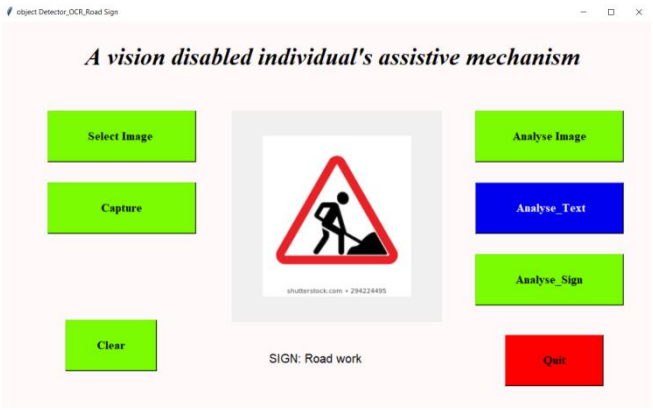

Figure 8. Sign detection window

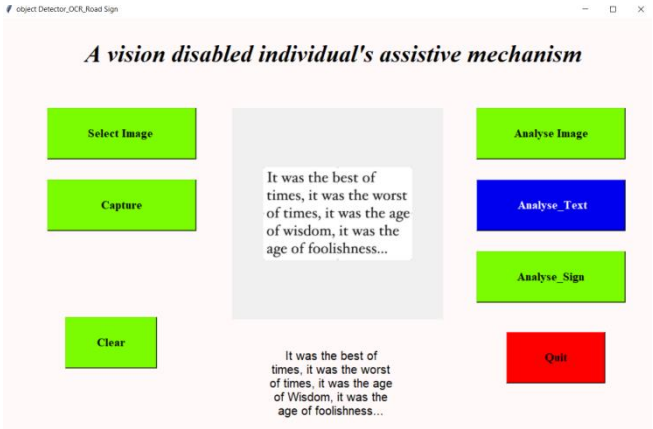

Figure 9. Text detection window

If the user wants to process a real-time image, this option is included in the live capture button. When the capture option is selected, the system's camera is automatically activated, and an image is captured in the GUI's center as shown in Figure 10. We get an output window after analyzing the image, where the object is recognized including its location in the frame. For audio assistance, this output is obtained through the system's speakers.

Figure 10. Realtime objects detection

VII. CONCLUSION

In our platform, we have created a word-based system with voice recognition software as well as object detection, recognition, and localization. Our proposed method decodes the required picture and identifies it aloud. The device can be utilized in a variety of ways because its result is already in the form of speech. This is an easy-hearing setup for people who are visually handicapped. This technology is both efficient and cost-effective solution for blind individuals. This equipment is advantageous for blind students at schools and universities. This can also be viewed as an example of artificial intelligence in action. It is beneficial to illiterate people and is also a smart technology that is highly important and feasible to society.

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Sentiment analysis of Covid-19 tweets and an dashboard for tracking Covid-19's spread.

Deep Vashisth[#1], Farooque Azam[*2], Avadhesh Singh[#3], Divyanshi Phatak[#4], Ashish Chauhan[#5]
*Assistant Professor, School of CSE, REVA University
#Students, School of CSE, REVA University
1 deepvashisth7777@gmail.com
2farooque.azam@reva.edu.in
3 kumarsinghavadhesh51@gmail.com
4 divyanshipathak3@gmail.com
5 ashu7043399@gmail.com

Abstract

The COVID19 outbreak has had a huge economic impact and has transformed people's lifestyles all across the world. To mitigate the impact of the COVID 19 epidemic, many people have already died, the job market has been impacted, and people's lifestyles have been altered.In this paper, we identified the public sentiment and opinion about the COVID19 vaccine based on Twitter content. Despite being vaccinated, there are disagreements about whether the COVID19 vaccine is safe, and some people are skeptical about vaccination. In this study, we analyzed tweets to classify emotions Regarding vaccination attitudes, as well as the vaccinations available, to understand the general perception of the COVID19 vaccine, and to respond to pandemics. Continuous monitoring of outbreaks has become important to make accurate decisions. Therefore, these reports lack proper data display and visualization and pose a real challenge for monitoring the status of COVID 19.

Introduction

COVID19 expanded globally since the first cases were reported in December 2019 [4], and the illness was labeled a Public Health Emergency of International Concern (PHEIC) on January 30, 2020 [2]. Daily, a large number of reports on the status of COVID19 are issued; pulling relevant insights from these reports is dependent on the quality of data as well as how well the data is presented and represented.The event and promotion of a vaccination are crucial for stopping the COVID19 outbreak from spreading further and decreasing the severe medical tension. Simple descriptive analyses of vaccine-related Twitter data have been undertaken in a number of studies to measure people's attitudes toward vaccinations and identify sentiment, public opinion, and subjectivity. Topics, Information transfer between people, and hence the most influential people for a certain sentiment, role models, and community discussion concerning vaccination. An interactive online dashboard has been created to deal with the problems in the present COVID19 reports published by the federal office of Health. The dashboard includes various interactive charts and tables that reflect the temporal and geographical spread of COVID19 cases

Literature survey

In [2], the author says that his research discusses Twitter Sentiment Analysis for monitoring and predicting Covid-19 Vaccine-related attitudes and methodology they used is Bernoulli NB, Random Forest, and Linear SVC. In [11], the author says that according to his findings, most people's attitudes regarding the three vaccinations are neutral or positive, with just slight negative feelings which he concludes by using TextBlob and Naïve Bayes classification to highly improve the accuracy. In [8], the author uses Classification of tweets which is done by CNN and RNN Classifier Sentiment analyzers used here are Textblob and Vader and concludes that They have used 4-5 sorts of classification that will make the project more accurate. The very best accuracy is achieved by CNN and RNN classifiers. The only Limitation during this work is that they don't analyze images .10%of the Twitter posts contain photos .In [6] author uses Logistic Regression ARIMA prediction and SEIR model and he uses NAR dynamic neural network model to forecast the next three months. In [9] author proves Moderna scored the lowest on the

negative sentiment value when compared to other vaccines, implying that it is the simplest impression with this analysis it is clear which vaccine is leading during a particular entry and he used Stream API to collect the data and Textblob library for sentiment Analysis

Objective

We aim to research the views and attitudes of voters within the country towards vaccines and covid19. We have tended to apply the Twitter API to gather tweets concerning the immunogen since it began. Immunogen uptake will be aided by addressing immunogen opposition and encouraging immunogen confidence through learning about people's feelings and ideas about immunization. The bulk of Twitter users wished to understand whether this existing immunogen will stop the unfolding of the COVID-19. As per a recent study In Some elements of the country, people's negative emotions square measure comparatively High, and their temperament to induce immunization is comparatively Low. Efforts to extend confidence within the effectiveness of the COVID-19 immunogen And to extend an individual's temperament to safeguard others through vaccination could also be a key to promoting immunogen acceptance. To give individuals AN estimate of the quantity of Covid cases in several states of the Republic of India. Further, to use constant information and make a demographic illustration to form it easier for individuals to know, our interactive dashboard monitors the unfolding of covid-19

Methodology:

Sentiment analysis Methodology.

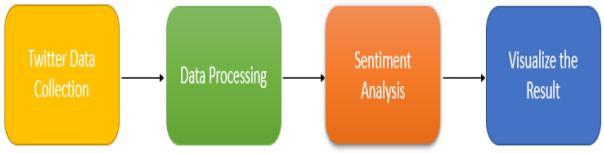


Figure 1: Process of Data gathering and performing analysis

First, various tweets related to people's sentiments on Covid-19 were collected with the help of a **Twitter API**, Tweepy. Once extraction is done, move ahead with data **pre-processing**, which involves cleaning of data and making it ready for further steps removing all types of unwanted data.
Data pre-processing involves cleaning null characters, and whitespaces, converting the alphabets into the same case, filtering the tweets done in various languages, etc

Sentiment Analysis

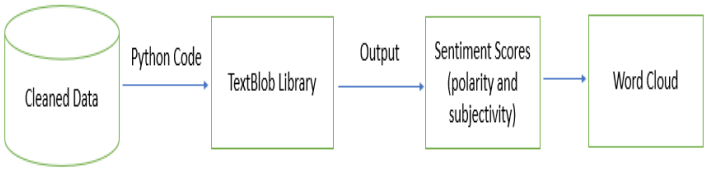
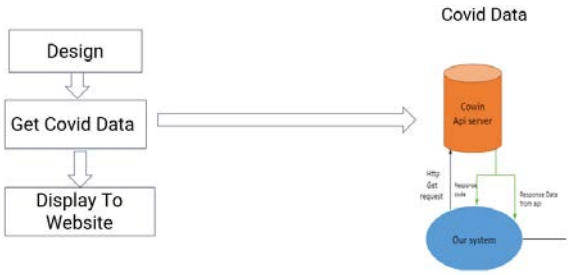


Figure 2: Process of Sentiment Analysis

For sentiment analysis we have used the **text blob** python library which helps us to calculate the sentence's polarity text blob gives us two things: polarity and subjectivity. Polarity is a great way to calculate positive, negative and neutral words. the range of polarity is ranging from (-1 to 1). After calculating with the help of word cloud library results are shown.

Pattern Analyzer (based on the pattern library) and NaiveBayes Analyzer are two sentiment analysis implementations in the textblob. sentiments module (an NLTK classifier trained on a movie reviews corpus).
For frontend we used React js. and for Backend we used Flask. using flask we get the data from tweepy and analysis done afterwards.

Architecture for Covid data

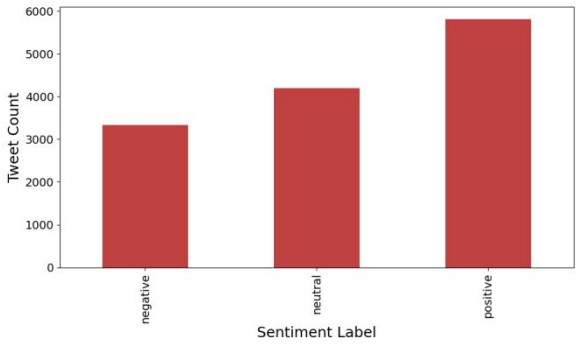


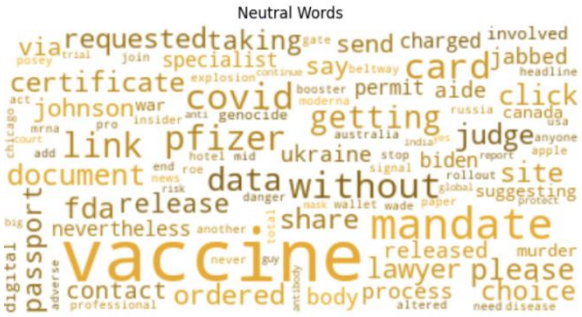
First the design of the page was made by softwares like figma and adobe xd, after the design we made a get request to covid19 api then in response we got json data and then we displayed the data in our website in the form of table.. once we got the data then we have visualize it with the library called react-chart.js and it is also displayed to our website.

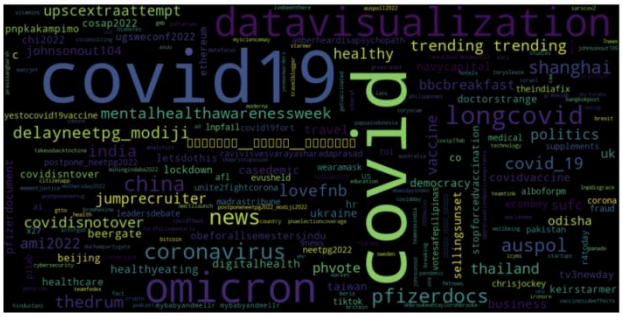
Conclusions:

In this study, sentiment and opinion analyzed about 15,000 tweets about the COVID19 vaccine. The Twitter platform used in this study could be a valuable tool for public health promotion to build vaccine acceptance and reduce vaccine hesitancy and opposition.
The findings presented here regarding vaccine comments suggest that anti-vaccination accounts on Twitter are partly automated content-generating Twitter bots as well as activists. Politician, author, and artist. Additionally, public health authorities can work through Twitter and other media to increase positive messaging, reduce negative and anti-social messaging, and proactively suspend anti-social accounts. Vaccinate like bots to encourage and

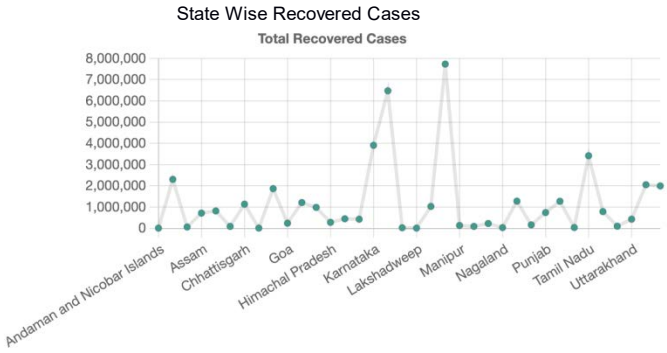
Result :







Twitter HashTagWordCloud



Polarity is very useful in sentiment analysis. Once we get the polarity from the text blob we can easily find out the negative, positive and neutral words. Range from (-1 to -0.01) can be considered as negative sentiment and from (-0.01 to 0.01) will be neutral and from (0.01 to 1) will be positive sentiments and then we have counted number of positive, negative and neutral words and visualizes it with the help of matplotlib library, then using word cloud library. We can easily made the word cloud visualization for negative, positive and neutral words. And in other word cloud we have made a list which consists of all people's hashtags in it. And at last Interactive dashboard by React-chart-js-2, it is a npm library which is used for data visualization in react.

References:

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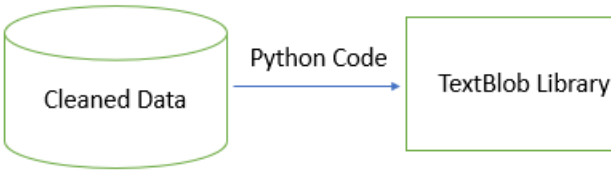
[13]https://www.mygov.in/covid-19
[14]https://www.worldometers.info/coronavirus/
[15]https://apisetu.gov.i

Pasting figure for more clarity
Figure 1:

Figure 2:



DEEP LEARNING-BASED PLANT DISEASE DETECTION

Sweta Gupta
Computer Science and Engineering
REVA University
Bangalore, India
swetaguptarph99@gmail.com

V Chandana
Computer Science and Engineering
REVA University
Bangalore, India
chandanachandu3514@gmail.com

Chaitra A C
Computer Science and Engineering
REVA University
Bangalore, India
chaitraacgowda2710@gmail.com

Ambati Vamsidhar Reddy
Computer Science and Engineering
REVA University
Bangalore, India
ambativamsi200@gmail.com

Meenakshi Sundaram A
Computer Science and Engineering
REVA University
Bangalore, India
meenakshi.sa@reva.edu.in

Sneha N
Computer science and Application
REVA University
Bangalore, India
Sneha2442@ gmail.com

Abstract— The proportion of agricultural production plays a central role in the country's economic development. However, crop diseases are the most serious obstacle to food production and quality. Early detection of crop diseases is critical to global health and well-being. In a traditional diagnostic procedure, a pathologist visits the site to visually assess each plant. However, manual training on plant diseases is limited due to inaccuracies and low staff. To address these issues, we need to develop an automated approach that can efficiently detect and classify diseases in many plants. Advanced technology has made it possible to produce enough food to satisfy society's desires. However, food and crop protection are still invincible. Factors including climate change, reduced pollen counts, and crop diseases pose difficult situations for farmers. An important background of these factors must be achieved as a matter of preference.

Keywords—CNN, deep learning, disease detection

I. INTRODUCTION

As farmers cultivate a wide variety of crops, plants protection is closely related to sustainable farming and climate agriculture plays important role in the economic sector, Indian economy sector accounts for 18% of GDP and it also provides employment for 50% of the people of India but, due to the plant diseases the harvest will be significantly less and leads to drought. The traditional detection is a visual assessment by a pathologist but, it's not easy to detect all kinds of disease by site at the same time if the computation is for a large form it takes a huge time in computing. In this project a deep learning-based model that has the data collection of healthy and disease symptom leaf with the proper and best split of that data, through pre-processing and finally, the confidence calculation component is responsible for providing the confidence level during the resulting.

II. LITERATURE SURVEY

In this project, we developed the model where it detects the virus, fungal and bacterial diseases so that diseases can be easily detected by some marks and the color and predicted by processing. The disease can be further used to maintain the crop field. This model will help in detecting plant disease without harming the plant leaf.

SYSTEM	AlGORITHMS USED	FEATURE EXTRACTION TECHNIQUE	ACCURACY	DRAWBACKS
Yellow Vein Mosaic Virus Disease Detection System	Naïve Bayesian K-means	Dominated-Featureset-Selection	87%	The system only Supports Okra plant diseases.
Plant Disease Identification Mobile Application	CNN Clustering	Not mentioned in the paper	97.6%	The user should supply plant details manually to start the process.
Crop disease recognition System Using Machine Learning	Random forests	HOG feature extraction	70%	To get accuracy An immersive number of data should be fed.
Crop disease detection of Jute plant.	Support Vector Machine	Grey_x0002_level Cooccurrence Matrices	80%-86%	The system only supports Jute plant YVMV disease.

Table 1. Various research on Plant leaf disease

III.REQUIREMENTS

- Hardware Components

a) PC

PC (personal computer) is for storing data and processing it in binary form, based on the instructions given to it. the requirement of the hardware is an i3 6th generation 6006U processor RAM of 6GB with a disk of 1TB.

b) Graphics Processing Unit (GPU)

GPU is an electric circuit that is commonly found in embedded systems, cell phones, and workstations as well. The graphics processing unit is used for fast mathematical calculation, personal computing, and accelerating machine learning. Our project is responsible for

rendering images that are both 2d and 3d which helps in computing the images faster so the epoch will run faster than usual, modern graphics processing units are more efficient in processing images.

- Software components

a) Keras

Keras is a python library, used in neural networks. Keras is used to create graphical representations of models, which aids in understanding the model's structure. Auto Keras, a Keras-based library, has also gained popularity and can be used to improve the speed with which results are obtained.

b) TensorFlow

In TensorFlow most of the APIs come built-in such as Keras API that helps in loading dataset, splitting it into required ratios of 6:3:1 where 60% is for training 30% for testing, and 10% for evaluation, loading labels, and the image processing. TensorFlow is a open-source deep learning framework by the Google team.

c) Open CV

Open CV is an open-source python library which is used in computer vision projects. It can perform operations such as image processing and video capturing.

d) NumPy

Numpy is used when working with multi-dimensional arrays. It's the most important Python package for scientific computation. It also includes functions for manipulating linear algebra, Fourier transforms, and matrices. Travis Oliphant created NumPy in 2005. This is a free open-source project. NumPy is an abbreviation for Numerical Python.

e) Google Colab

Google colab is a jupyter notebook where it can easily integrate with drive and run on the cloud, where data can be easily accessible. The notebooks can be shared and edited concurrently by team members, even if they are in different locations. The notebooks can also be shared with the public by publishing them on Git Hub. Google spent many years developing TensorFlow, an AI framework, and Collaboratory, a development tool. TensorFlow is now open-source, and Google has made Collaboratory available to the public for free since 2017. Google Colab, or simply Colab, has replaced Collaboratory.

f) CNN

CNN is a complex neural network chain that works to extract image features from a trained data set and classify them to produce the desired output. It trains the neural networks by converting the data set images to numerical values. Without any intervention of human, CNN can detect features on its own. ConvNets outperform machine learning algorithms in terms of power and efficiency. These numerical values are then organized into numerical arrays based on their categorized properties. These arrays are then distributed to various nodes in the network and iterated multiple times based on the input provided.

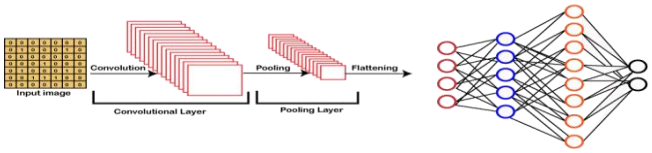


Fig. CNN

CNN models are used for geographical classification in a variety of companies that require data to be classified quickly and securely. It acts almost like a filter, removing dust and separating image features. Below are the layers in CNN that are depicted in the above image.

i. Convolutional Layer

In this layer, feature map is extracted where in the filter of specific size is used to perform convolution on input images with specific stride. The dot product is used in the operation of filtering. Then, the result of this layer i.e., feature map is used in next layers.

ii. Pooling layer

This layer is used to reduce the size of feature map by extracting the maximum value from the stride of specific size. So that, the computations to the computer will be greatly reduced and can be both time saving as well as cost saving. In this model we used max pooling.

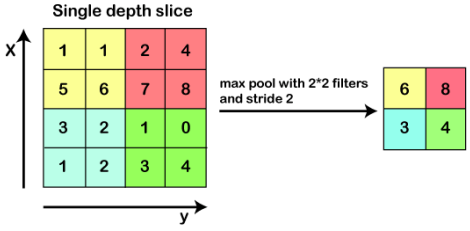


Fig. Max Pooling

iii. Activation Function

The activation of neural networks is a crucial aspect of deep learning. It's precision and consistency, as well as the computational efficiency of creating and interrupting massive neural networks. To put it another way, the activation function can be thought of as a mathematical condition that defines the neural network's output. The output of each neuron is usually justified by operational functions with an execution between 1 and 1 or between 1 and 1.

The activation function adds non-linearity to the model, allowing you to learn complex input-to-response function mappings. In this model we have used ReLU Activation function.

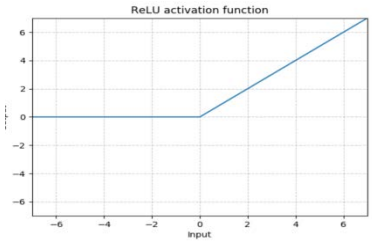


Fig. ReLU

iv. Fully-Connected Layer

This layer classifies based features extracted in previous layers and their filters. In convolutional and pooling layers tend to use Relu features, in fully connected layer basically leverages a SoftMax activation to calculate inputs, and gives a chance from zero to one at least. Usually, the suppression layer is used among all consecutive completely related layers to result in non-linearity and reduce overload, respectively.

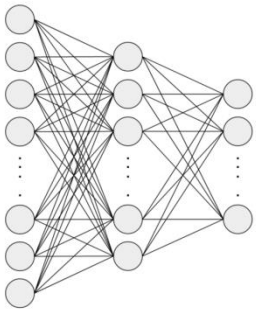


Fig. Fully Connected Layer

v. Dropout layer

Dropout layers are used in convolutional neural network models to avoid overfitting demonstrations. It acts as a regulator in the neural assembly.

IV.FLOW OF SYSTEM

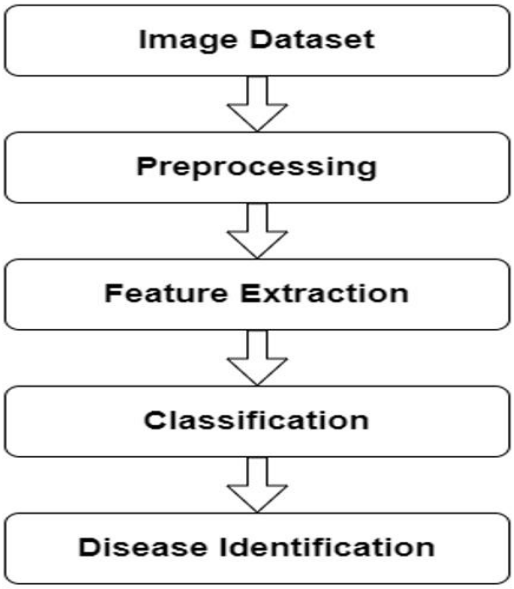


Fig. Model Flow

V. IMPLEMENTATION METHODOLOGY

The system is made up of a deep learning model that has been trained to recognize a specific plant disease. Deep learning is used in the system to detect crop diseases automatically. It is proposed to use Convolutional Neural Network as the deep learning algorithm.

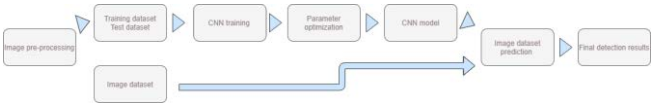


Fig. Methodology

Before sending the image to the network, the RGB image of the leaf, width, and height of 254 and 254 respectively, is scaled to 224 * 224 in the image preprocessing part and then this will an input layer of the CNN. Then this image is dispatched via a CNN which encodes this image into the array of numbers and classifies it with the opposite arrays in the version. The model is a tensor Flow version that is made into a tensor flow lite model due to the huge size of the normal tensor flow version. This model facilitates classifying the uploaded image numerical value to the data set values. when a numerical array fits it calculates the probability and shows the value which has the high probability which will be shown in the output.

a)DATASET:

With the intention to get a minimal loss and higher accuracy. we have used a big dataset for creating the model of CNN. The dataset of 10,000 leaf pictures of both healthy and diseased are used to train the CNN model that belong to 10 classes. The CNN model is tested against various kinds of data partitioning and the best partition of 6:3:1 is selected and the dataset is divided accordingly into three partitions. The dataset includes four forms of plant species and six sorts of plant diseases collectively 10 classes. The dataset incorporates both healthy and diseased crop images. The images cover species of crops, like Betel, cinnamon, coffee, and manioc. each of the pictures is re-sized and segmented for pre-processing and further classification.

b) PRE-PROCESSING OF THE IMAGES:

The picture of the plants are merged by pre-processing for best results. Pre-processing an image follows the steps of resizing the image, increasing the edges, and filtering the image. To use 8-way proximity measurement to isolate diseased plant areas and further examine the segmented sections, it is important to convert them to RGB format and restore the original colors. The image is processed for plant disease with the plant disease detection model. Using a pre-trained model. plant leaves are then analysed for the disease symptoms of the plant with the help of a dataset and CNN.

```
validation_datagen = tf.keras.preprocessing.image.ImageDataGenerator(rescale=1/255)
validation_generator = validation_datagen.flow_from_directory(
    val_dir,
    shuffle=False,
    seed=42,
    color_mode="rgb",
    class_mode="categorical",
    target_size=IMAGE_SHAPE[:2],
    batch_size=BATCH_SIZE)
```

Snippet for Preprocessing

c) FEATURE EXTRACTION:

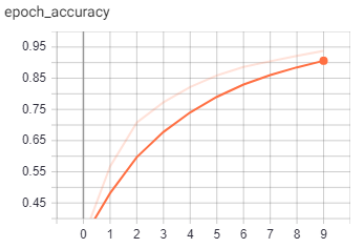
In the feature extraction, we take the picture and convert it into decreased variables. essentially each pixel of the images is taken and converted into a matrix for appearing convolutions. The manner runs throughout all the pixels in which the convolution matrix is extended with every pixel matrix. Also, we mention the variety of strides which refers to the shifting of the pixel matrix. once all the values are acquired by using multiplication, we then carry out Pooling at the matrix. Here we are the usage of Max pooling for our system for higher accuracy and extraction of capabilities. Each process i.e., Convolution and Pooling shapes an epoch. Now to improve the system accuracy we perform some of the epochs, but this could purpose to grow inside the range of parameters. As a result, following these steps we get to extract specific capabilities from the snapshots. these specific capabilities are then sent for similar approaches. Fig. 1 depicts pictorial information for the below piece of code.

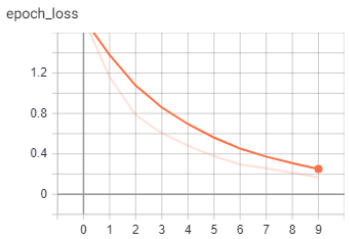
```
model = Sequential()


model.add(Conv2D(filters=32, kernel_size=(3,3),input_shape= IMAGE_SHAPE,padding='same', activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))

model.add(Conv2D(filters=64, kernel_size=(3,3), padding='same', activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))

model.add(Conv2D(filters=128, kernel_size=(3,3),padding='same', activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))

model.add(Conv2D(filters=256, kernel_size=(3,3),padding='same', activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))

results = model.fit(
                    train_generator,
                    epochs=10,
                    steps_per_epoch=train_generator.samples//train_generator.batch_size,
                    validation_data=validation_generator,
                    validation_steps=validation_generator.samples//validation_generator.batch_size,
                    callbacks=[tensorboard]
                   )
```

Snippet for Feature Extraction

VI. ACQUIRED RESULTS

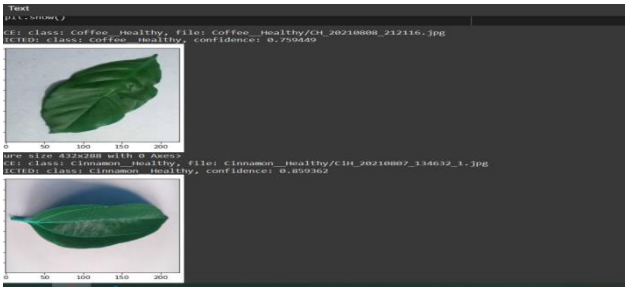
We can capture plant diseases, show expected results, view snapshots, and use deep learning models that include plant names and a brief description of the disease. This is because the functional requirements considered in this task are successfully met with all useful necessities.





The Above graphs depicts training accuracy and loss respectively changing from each epoch. Accuracy is increasing from each epoch where as loss is reducing from each epoch. After 10 epochs, we get a training accuracy of 92.42% and loss of 19.86%. we chose 10 epochs because we found it best for the model as the accuracy and loss are good.

Below are some of the model results:



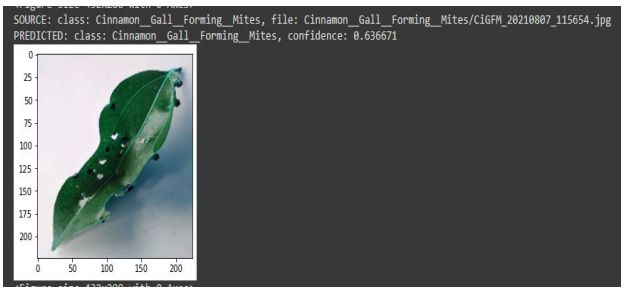
In the above result,

i. When we fed the model with Coffee_Healthy leaf picture then it has predicted the disease class as Coffee_Healthy, which is correct with an accuracy of 75.94%.

ii. When we fed the model with Cinnamon_Healthy leaf picture then it has predicted the disease class as Cinnamon_Healthy, which is correct with an accuracy of 85.93%.

In the above result,

When we fed the model with Coffee_Cercospora_Leaf_Spot leaf picture then it has predicted the disease class as Coffee_Cercospora_Leaf_Spot, which is correct with an accuracy of 75.08%.

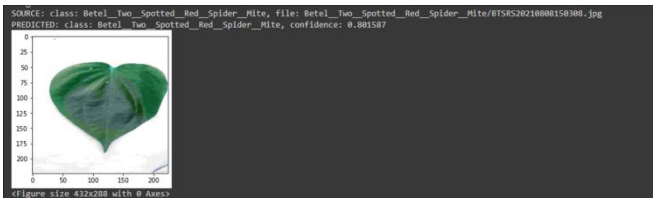


In the above result,

When we fed the model with Cinnamon_Gall_Forming_Mites leaf picture then it has predicted the disease class as Cinnamon_Gall_Forming_Mites, which is correct with an accuracy of 63.66%.

In the above result,

When we fed the model with Manioc_Healthy leaf picture then it has predicted the disease class as Manioc_Healthy, which is correct with an accuracy of 98.70%.

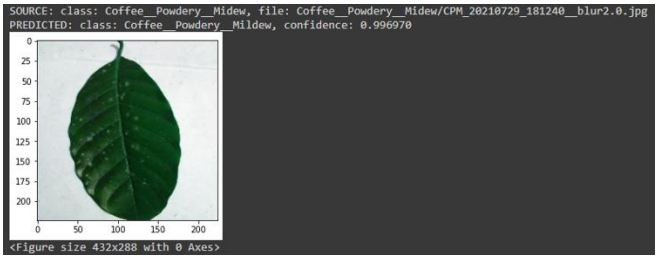


In the above result,

When we fed the model with Betel_Two_Spotted_Red_Spider_Mite leaf picture then it has predicted the disease class as Betel_Two_Spotted_Red_Spider_Mite, which is correct with an accuracy of 80.15%.

In the above result,

When we fed the model with Manioc_Mosaic_Disease leaf picture then it has predicted the disease class as Manioc_Mosaic_Disease, which is correct with an accuracy of 94.52%.



In the above result,

When we fed the model with Coffee_Powdery_Mildew picture then it has predicted the disease class as Coffee_Powdery_Mildew, which is correct with an accuracy of 99.69%.

In the above result,

When we fed the model with Cinnamon_Gall_Forming_Mites leaf picture then it has predicted the disease class as Cinnamon_Healthy, which is incorrect.

In the above result,

When we fed the model with Betel_Healthy leaf picture then it has predicted the disease class as Betel_Two_Spotted_Red_Spider_Mite, which is incorrect.

VII. CONCLUSION

Currently, the deep learning model has an accuracy of 82.5 percent. The validation and test datasets are used to inform the approach of this CNN architecture and the model's outcome. CNN is used to detect diseases. The model is essentially tested on specific types of plants and their few diseases specifically. As an expansion of the project, the number of plant classes and their diseases will be increased in future. The model will also be enhanced by expanding training and testing parameters.

This project displays the potential of deep learning techniques for crop disease identification. Their findings are genuinely promising for the development of the latest agricultural gear that could make contributions to an extra sustainable and cosy food manufacturing.

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dStream - Decentralized Streaming Platform using Livepeer Network and CDN

Adarsh A. Nair, Aniketh V. Hotagi, Abdul Mateen, Ankit Kumar, and Kiran M
School of Computer Science and Engineering, REVA University

Abstract

Twitch.tv, Facebook gaming and similar content streaming platforms provide their services at a higher monetization cost, with unfair content promotion, and offer lower revenues due to rising platform costs. Most of the content uploaded to a centralized video platform is controlled by the platform owner rather than the content creator. Additionally, copyright infringement and the unauthorized distribution of protected content is a significant issue on popular video platforms. As a result, copyright protection, illegal access control, and legitimate video file distribution are needed, as well as adequate compensation for the creator's creative work. The project aims to develop a decentralized video streaming platform on top of Blockchain technology by using Smart Contracts and a shared network of transcoding computing nodes through Livepeer Network.

Keywords — Blockchain, NFT, Streaming, Livepeer, Content Delivery Network

1. INTRODUCTION

dStream is a native web3 app that lets streamers/virtual-event organizers create token-gated streams on the platform which helps them to make their content available exclusive to token holders. Token-Gating is a mechanism that is used in granting access to holders of a specific token or NFT. In our platform we enable token-gating with the help of web3 and the blockchain.
Instead of using third parties such as Twitch.tv, streamers can stream directly to their viewers using a decentralized platform/service. With the use of a decentralized platform/service streamers can own their content and promote freely.

2. LITERATURE SURVEY

Live streaming is a term used for broadcasting and recording media in real-time. Today, live streaming is a well know field and has huge popularity. For example, a Twitch streamer known by the name Martinez on 11 January 2021 broke the record for most concurrent viewers for a Twitch stream by an individual with 2,468,668 peak concurrent viewers. With the growing popularity of these streaming platforms grows the price to use the service. Streamers pay 50% of their earnings to the platform for their service.

These centralized platforms have unfair control over who is enforced with the policies. There have been multiple instances where these central platforms do not always follow

through their own Terms of Service in instances which would benefit the platform from a business standpoint. Recently, twitch a centralized streaming platform had been hacked by an anonymous data breach which resulted in the source code of the mobile, desktop and video game console clients being leaked to the public along with the earnings of the streamers.

A distributed platform offers solutions to most of the mentioned problems, and it cuts the third-party platforms. It offers peer-to-peer (P2P) connectivity which removes the chances of data breaches as only the owner accesses their details. Livepeer is a protocol that provides an infrastructure for performing computation required for delivering live streams over a distributed network of nodes.

One of the problems of establishing consumer video services today is scaling infrastructure to accommodate the demand for the rising number of streams and expanding the number of customers as new users are added. Livepeer offers a dependable service infrastructure that can scale to handle any number of streams and viewers.

While current networks such as Twitter and Facebook provide incredible live video options for reaching a wide audience, they are also often the first to be banned or restricted in a variety of political crisis scenarios. With the help of a decentralized network, it would be extremely difficult to censor streamers. [1], [2], [3], [4], [5]

3. METHODOLOGY

A. Livepeer Protocol

Livepeer is a “decentralized video streaming network built on the Ethereum blockchain” [6]. It is used as the base foundation for developing a video streaming platform. It offers us broadcaster nodes for streaming content and transcoder nodes for transcoding live video feeds. “Transcoding” is the process of reformatting a raw video file such that it works optimally on any bandwidth - whether 2g or 5g - and on any device. Livepeer provides a scalable and cost-effective infrastructure solution capable of meeting today's streaming demand. It improves reliability of video streaming and reduces the related expenses by up to 50x.

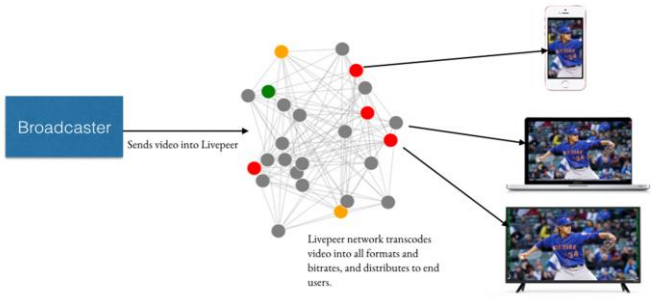

Fig. 1. Working of Livepeer Protocol.

Livepeer protocol includes two key actors – *Orchestrators* and *Delegators*.

The video feed streamed by broadcasters are received by orchestrators - users who give their CPU, GPU, and bandwidth to the network incentivized by the Livepeer network or the broadcasters to receive stable coin (such as DAI, USDT, etc.) or Ethereum Token (ETH). Orchestrators are required to stake Livepeer Token (LPT) in order to take part in the network as transcoding nodes.

Delegators are Livepeer token holders who contribute to the network by staking their tokens to orchestrators they think are doing a good job. Consider staking in the same way that you would make a deposit. When you stake, your tokens are temporarily locked and may be retrieved or staked to another Orchestrator. As a result, the network's security is increased. [6]

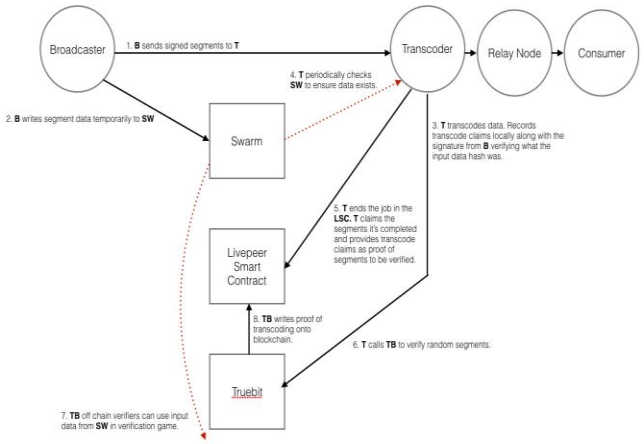

Fig. 2. A preview of roles & information flow.

B. Metamask

Metamask is a cryptocurrency wallet that supports ETH-based tokens such as ERC-721 and ERC-20. It is accessible as a browser extension. It lets the user store any assets owned on the blockchain. Metamask also provides API and utility helpers for interacting with the blockchain, it enables signing of messages required for authentication. Users are authenticated by signing a message with their private key, which generates a signature that is verified by the backend by using the user's public key.

C. NFT Tokens

NFTs are tokens that may be used to denote unique object ownership. Art, valuables, and even real estate may all be tokenized with them. Generally, an NFT token can have only one legitimate owner at a time, it is ensured with the help of smart contracts deployed on the blockchain — no one can change the ownership of the NFT token or create a new NFT.

Non-fungible token (NFT) is a term that implies to a token that is not fungible. Non-fungible is a phrase used in economics to describe items such as furniture, music files, and computers. Because these goods have distinct features, they cannot be substituted with other items. [7]

The project employs the NFT tokens and enriches the inherent value of the token by providing restricted/exclusive access to events by verifying ownership of the NFT token.

D. Moralis

Moralis is used as a tool to retrieve the publicly accessible NFT tokens that are available on a user's account and to validate the ownership of an NFT token claim that is used to access token-gated streams on the platform.

4. EXPERIMENTAL RESULTS

With this project, we successfully performed the following tasks in the application.

a. Register new users and login already registered users to the application.

b. Let users successfully and easily connect to their crypto currency wallets and retrieve their NFTs and tokens.

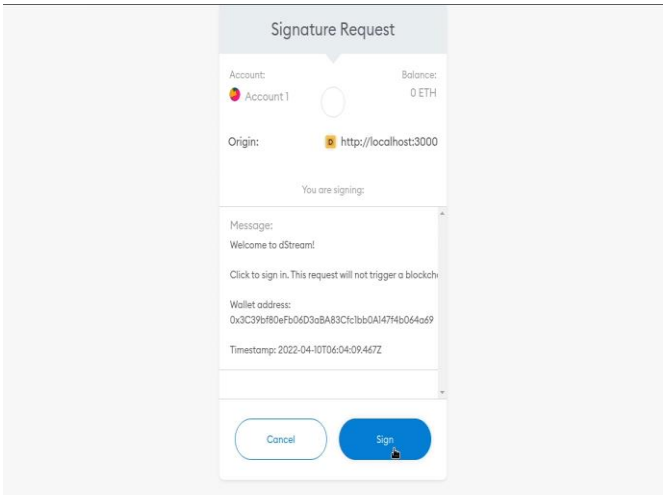

Fig. 3. Connecting to wallet using *Metamask*.

c. Let users create and list new streams and virtual events and provide them with the stream key and link.

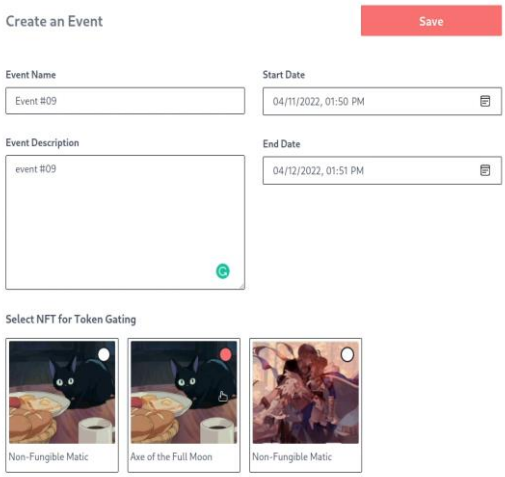

Fig. 4. Event creation page.

d. Let users start streaming with any available streaming application using the provided stream key and link.

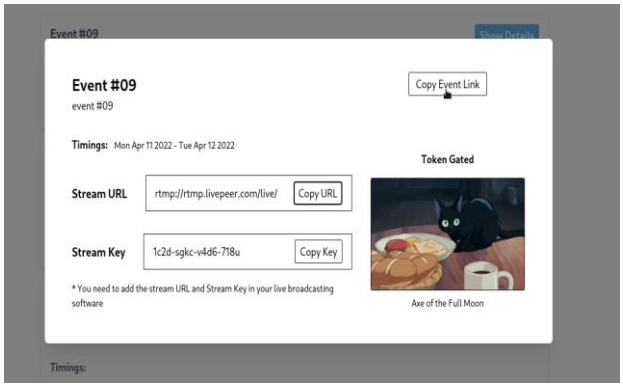

Fig. 5. Listing Stream details with keys and links.

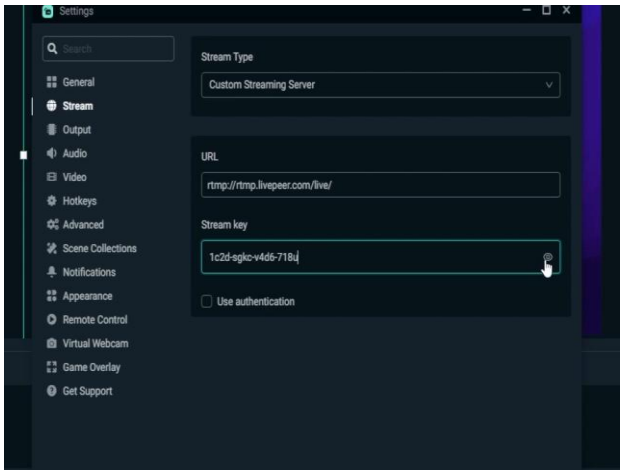

Fig. 6. Starting Stream with provided stream key.

e. Authorize users joining the stream using the link of that stream and only allow if they have the required token/NFT.

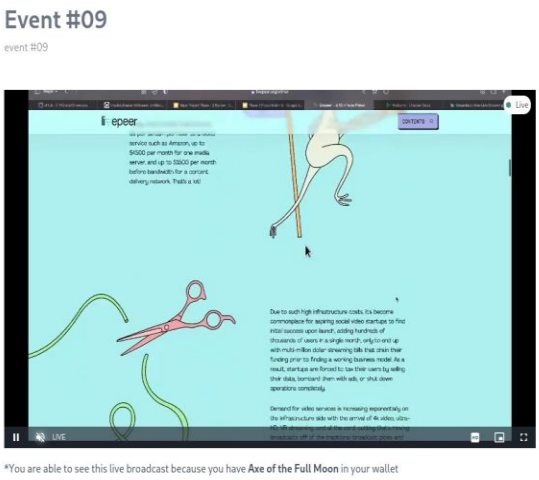

Fig. 7. Viewing the live stream using token.

The following cost is the expected cost for 1-hour long stream with 1000 concurrent viewers with 100% stream watch time.

TABLE I. Comparison between cost of Decentralized & Centralized Platform.

Parameters	Livepeer	AWS based platform
Transcoding	$ 0.30	$ 1.71
Stream Delivery	$ 17.17	$ 67.24
Multistreaming	$ 0.02	$ 0.40
Total (in USD)	$ 17.49	$ 69.35

As per the above table, the expected cost of a platform using Livepeer is *less than 30% of third-party based platforms*.

5. CONCLUSION

This proposed work removes third party between the viewers and the streamers and gives ownership of the content to its creator while being comparatively cheaper than the other alternative centralized streaming platforms.

5.1 Future Work

We plan to implement the following tasks in the application:

1. Smart contracts for storing event details.
2. Dedicated Fungible ERC20 token for donations and monetization.
3. Real-time chat integration using off-chain service / on-chain implementation with secretum. [8]

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Smart Contracts using BlockChain as a means of self Regulated Open Source Crowdfunding

Akram Pasha[1], Ashish Sood[2], Arjun S Prakash[3], Anmol Trivedi[4], Arjun P[5]

Computer Science Engineering Reva University akram.pasha@reva.edu.in[1] , Computer Science Engineering Reva University r18cs066@cit.reva.edu.in [2],Computer Science Engineering Reva University r18cs061@cit.reva.edu.in[3], Computer Science Engineering Reva University r18cs047@cit.reva.edu.in[4] ,Computer Science Engineering Reva University r18cs060@cit.reva.edu.in[5]

Abstract

For a long time, Blockchain has been an exciting research topic, and many firms have benefited from its benefits. Likewise, Blockchain technology offers a lot of potential in the healthcare sector because of privacy, confidentiality, decentralization and security, Nonetheless, Electronic Health Record (EHR) systems are plagued by worries about data security, integrity, privacy and administration. We address how Blockchain technology may be utilized to improve EHR systems and how it could be a solution to these problems in this paper. We present a patient centric approach for integrating Blockchain technology for electronic health records in the healthcare sector. Also, to offer secure storage of electronic records for users of the proposed framework by specifying granular access controls. This framework gives the EHR system the advantages of a Scalable, secure, and integrated blockchain-based system.

Keywords – Blockchain, Decentralization, EHR, Patient Centric, Privacy, Security.

I. INTRODUCTION

Crowdfunding offers a lot of benefits for entrepreneurs and other start-ups who have a genuinely great project idea they want to work on but do not have access to funds for the resources they need to complete their project idea or fund their new startup. Traditionally these innovators turn to family,friends or small finance organizations. These small finance organizations charge exorbitant interest rates and for the most part charge very high interest charges in order to receive funding from them.

When we look at the existing crowdfunding platforms, we see that corporations charge both the donor and the user a large fee. Between the investors and the user implementing the project, there is also a lack of communication, trust, and transparency. Given the existing crowdfunding platforms' flaws and high rates, using blockchain technology is a logical commercial decision. Every transaction which is recorded on the blockchain, which is a decentralized digital ledger that cannot be tampered with. All of the records are kept in each of the decentralized network's nodes because it is a distributed system that works on

the shared consensus protocol. Ethereum virtual machines make it easier to create and run Smart Contracts, which are blockchain-based applications. All smart contracts are run on the traditionally used Ethereum Virtual Machine and Ether is used as the currency for our project. Crowdfunding is a straightforward method of raising funds for innovative project ideas. The problem with existing crowdfunding platforms is that they demand high fees and there have been many frauds committed either by the investors or the project managers. These problems may be avoided by using blockchain to develop a crowdfunding strategy. Traditional transaction expenses and platform fees commonly associated with other crowdfunding platforms, such as Kickstarter, are abolished when smart contracts are used for crowdfunding. [4]

The purpose of our project is to create a trustworthy application that will allow any new idea to become a reality. We're going to build a blockchain-based crowdfunding platform.It is presented in a very user-friendly interface for anybody who wants to implement and exchange ideas about the project or idea that they want to develop. These concepts are then approved by any investor who is interested in funding the project and then shared with the audience. Anyone who wants to financially support their principles and ideas are always welcome to do so. All these processes are carried out as a team effort.

By utilizing smart contracts for crowdfunding, traditional transaction and platform charges associated with existing crowdfunding platforms, such as Kickstarter, will be totally nullified. The purpose of our project is to create a trustworthy application that will allow any new idea to become reality. A blockchain-based crowdfunding platform will be developed by us. All of these steps are carried out in coordination with investors and company founders.

II. LITERATURE SURVEY

The scientific and scholarly articles which were searched on this topic were first identified google scholarly articles for the term ‘Crowdfunding’, the search was continued based on the citations which were given, after which led us to the terms such as P2P crowdfunding, social lending and person- person lending were stumbled upon and later investigated.

This is a very recent trend hence the papers which were referred to follow a “Phenomenon-Based-Approach” (Von Krough, Rossi Lamastra and Haefilger, 2012). Before crowdfunding was used [2]

Since crowdfunding is currently a relatively new field the amount of scholarly articles and papers are very limited.

The first publications addressing the issue of how to make crowdfunding more sustainable were published in 2011, then after a two-year hiatus, another study on the subject was released in 2013. As a result, while research in this topic is still in its early stages, the number of articles published has been steadily growing. In terms of the research methodologies employed, quantitative methods have recently gained popularity [3]. According to our investigation, no significant journal in this subject has published more than four articles on the long-term viability of crowdfunding, leading our team to the conclusion that any type of research in this sector is only seldom published. According to

our research, donation based crowdfunding received the highest amount of attention. Lending based crowdfunding approaches are the most relevant type of crowd funding practices when assessed by market based volume of 76%, but addressed only in 16% of the publications. The same contrast was also derived from in the crowd funding platforms examined, among what were examined, kickstarter which is a reward based crowdfunding platform is the favorite chosen source of data.

Crowdfunding is a relatively new trend which is slowly gaining popularity. According to one definition, "crowdfunding" is the ability to gather a generous amount of money from a large pool of potential investors and stakeholders. Thus far, crowdfunding has gained a lot of popularity driven mainly because of the international financial crisis of 2008 [7], which resulted in credit institutions tightening their financial strength and solvency criteria. In this new age which relies heavily on the internet for their day to day tasks and the unlimited access almost everyone has, it is possible to sustain large crowds of local and foreign investors in a cost-effective manner, playing major roles in the growth and spread of crowdfunding (IOSCO 2015). [5]

Crowdfunding is now considered as a great opportunity for individuals to get “entrepreneurial financing” which is serving as a great alternative to the existing financial mechanisms. examples include banks, credit institutions, small financial institutions and angel investors. Crowdfunding can provide a great alternative way for investors to access their funds and financial assets.

In the future, this will result in a diversification of the financial markets. Changes in financial institution laws, for example, might be viewed as a constraint on the successful functioning of financial markets for entrepreneurial firms. Globally, the financial health of developing businesses and SMEs, as well as their access to capital, has deteriorated to some extent. As a result, businesses have not always been able to meet their project funding needs through traditional sources of capital, resulting in financing gaps in some circumstances (European Commission 2018b).

Of course, not every firm is supported financially. As a result, funding alternatives to bank financing, such as risk and equity finance (i.e. bond markets, crowdsourcing, and venture capital), have become more important from the perspective of growth-oriented businesses. Equity crowdfunding is especially important for assisting the growth of technology-intensive and innovative enterprises in general. This is especially true when a company is trying to break into new markets or develop new products. Palmer discovered in his research that the cost of (crowd) fundraising (i.e. associated fees) isn't the key reason why some companies opt to use crowdsourcing.[3]

III. PROPOSED WORK

Traditional crowdfunding platforms have a number of disadvantages, including: operational fees, strict laws and regulations, startups acting in bad faith, and intellectual property risks.

Because of the drawbacks of traditional crowdfunding platforms, blockchain technology is a viable business choice.Crowdfunding systems based on blockchain technology have the potential to become a more acceptable source of funding for a variety of initiatives and causes.

For example, blockchain smart contract solutions automate the release of funds only when milestones demonstrate that the funds will be required in the future. Fundamentally, blockchain crowdfunding systems may give vital oversight into individual campaigns while lowering the amount of trust required for investment.

This project's goals would be: Improved Equity Accessibility Rather than relying on a crowdfunding site to facilitate pre-orders of impending tangible items, blockchain offers asset tokenization tools. Asset tokenization combines the benefits of blockchain technology with the ability for investors to generate equity or fractional ownership of a real asset. An entrepreneur who plans to utilize the cash to produce multiple new items, for example, can give each new investor a tiny ownership share in the company in proportion to their contribution. It has the ability to bring whole new investment opportunities to the table. Any initiative using a blockchain-based crowdfunding mechanism has a good probability of succeeding. Anyone with an internet connection may contribute to such endeavors.

Cryptocurrencies, crowdfunded companies or product stakes are traded on a peer-to-peer basis. As a result, contributors would have more liquidity in their investments. It might be a good method to stimulate people's interest in the overall endeavor. It has the ability to give rise to a new type of marketplace.

You can streamline operations and eliminate third parties using smart contracts, saving fundraisers money and allowing them to spend exactly the amount they intended to invest

This project entails the establishment of a website that serves as an interface between the contracting parties, particularly the investing and receiving parties. Each partner will be given the option of securely logging in to a page that contains up-to-date information about their specific projects. Ethereum allows Smart Contracts to be implemented using blockchain technology. These enable for the creation of immutable and distributed contracts between an investor and an entrepreneur/NGO. There is sufficient study material and instruction on the usage of blockchain in this domain available online to allow us to properly implement our plan.

In today's world, a startup begins with a basic concept. They are supported by investors who share the entrepreneur's vision and/or interest. In this process, platforms like Kickstarter operate as a middleman, whereas smart contracts might put the investor and entrepreneur in direct communication. When prepared with the help of competent legal advice, smart contracts can be made totally clear in the case of a disagreement. In this project, blockchain will be used to the greatest extent possible to maximize security, ease, and practicality.This project uses a blockchain and the cryptocurrency Ethereum, which is now the market leader in the field of smart contracts.

Because no physical hardware, such as sensors, are involved, the project is built entirely with open source software. As a result, there are no expenditures associated with completing this project.

IV. METHODOLOGY

Smart Contract

A smart contract is a contract that may be executed automatically and must be carried out according to the provisions of the contract. While certain aspects of Smart Contracts may be done automatically by a machine, others require human input and control. Can be enforced both legally and via computer code that cannot be updated or approved in the implementation or execution of rights. Smart Contracts may be used on top of blockchain technology to automate complex transactions. To enable, execute, and enforce a transaction, a Smart Contract is a code that may be performed and executed on a blockchain network.

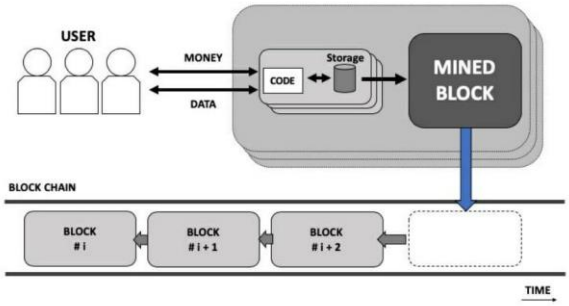

Fig1: Smart Contract

A Smart Contract is made up of an account balance, personal storage, and executable code (Fig 1). The status of the smart contract is updated in a single linked block every time the contract is invoked.The code in the blockchain cannot be modified once the contract has been submitted. Sending a transaction to a unique address can be used to execute it by using 20 bytes from the contract. The contract is then carried out by the network's miners in order to achieve consensus output, after which the contract's status is renewed.

Contracts can read and write transactions to personal storage, as well as deposit money into their accounts.

Blockchain

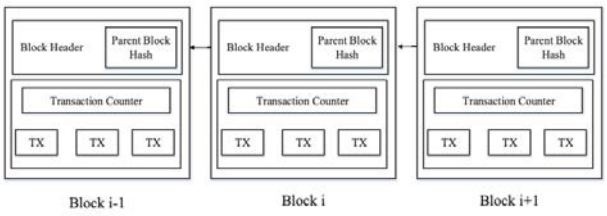

Fig 2 : A sequence of blocks

The above Fig 2 demonstrates how the structure of the series of blocks look like in the blockchain network. These are just a series of such blocks which hold information such as

the transaction details depending upon the block size of each of the blocks. The features of Blockchains include:

- Decentralization : Unlike any bank or central agencies which come under the direct power of the govt. which means each transaction done is regulated, this requires a lot of time, effort and storage. All these can be avoided by using a blockchain technology using the consensus protocol where all the blocks or nodes in a network take a vote in order to verify a transaction

- Persistency : All of the records entered into the blockchain ledgers can be verified quickly by the miners of the block. It is almost impossible to roll back or modify the changes in a blockchain network. Any block in the network that has been tampered with can be immediately found out.

- Anonymous: All the individuals in the network interact with each other through a generated address, no real identities are used in any interactions with each other.

- Proof Of Work: It is a consensus protocol in which the algorithm is used to confirm a new transaction and creates a new block into the network.

The main purpose of the blockchain used in our project is to tackle the increasing problems, particularly in terms of establishing trust. Blockchains basically are digital ledgers that are resistant to destruction. Blockchains is a distributed peer to peer database that houses a worldwide record of all completed transactions that is confirmed by the system's majority of consensus and then shared with all parties involved. After data has been entered into the ledger, it cannot be deleted under any circumstance. The blockchain, which keeps track of specific transactions, may be used to validate all the transactions that have ever taken place.

In our system, the campaigners will post their project ideas in the main campaign page and the parties who want to support the idea such as investors can donate funds in the form of ether for a particular project idea that they are interested in. How it differs from traditional crowdfunding approaches is that the money is digital currency such as Ether. All these ether transactions will be recorded and be stored in an immutable ledger which works on a peer to peer network system. The Donor has complete control over the donated ether. Only half of the investors need to approve the request made by the creators. By giving control on invested money the trust is made.

V. CONCLUSION AND FUTURE WORKS

Traditional crowdfunding systems have long been plagued with inconsistency and fraud. It's a preventable problem, and we feel we've put in place a strong solution that will put an end to these long-standing issues.

To a large extent, the goal of having a transparent, anti-fraudulent, decentralized platform has been met. This project addressed the flaws in typical crowdfunding platforms in order

to increase openness in the crowdfunding process and develop confidence among people, allowing them to donate their income to good causes without fear of fraud.We have taken that into consideration and designed this app so that even a common man can use it with ease. But this is not the end. With the evolution of Blockchain and introduction of ICOs, our application has a bright future and a large scope for improvement and evolution.

The world is still adapting to Blockchain and Cryptocurrencies, and Ethereum-based Dapps will take a few years longer to become popular and accepted by the community. In this context, a Blockchain-based crowdfunding application is a difficult notion for everyone to grasp. We've taken that into account and built this software to be simple enough for even the most inexperienced user to use. But this isn't the top of the story. Our application has a bright future and plenty of room for growth and evolution, thanks to the evolution of Blockchain and the advent of ICOs. Through our crowdfunding application, we hope to make it even simpler and safer for all ideas to come to life in the future.

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Deep Learning Based Image Classification Using Small VGGNet Architecture

Kishan K Nayak, Prabhudev N, Rohan A R, Supriya S, Nayana R
Reva University Bangalore Karnataka
nayana.r@reva.edu.in

***Abstract*: *One* of the most intriguing and important areas of computer vision is a bracket. Deep literacy is important in image brackets because it allows for the grouping of analogous images. Certain adaptations to the images must be made before feeding them to the training model, like normalization, image resizing, slate-scaling, and so on. Following image-processing, the coming task is to prize features from the images, draw boxes around the objects in the image, and eventually classify the images grounded on the discovery of objects in the images. In a nutshell, a bracket is a simple task for humans but a delicate task for machines. For this situation, we'll utilize the Small VGGNet (VGG-Visual Geometry Group) Architecture, which is a sort of convolutional brain organization, to characterize pictures utilizing profound learning. The certified model is approved by utilizing three arbitrary pictures from Google. We explored different avenues regarding scaling the picture to various sizes. The profound learning model, which utilizes a Small VGGNet design to zero in on picture arrangement, performed incredibly well, accurately ordering the pictures.Google Photos has already implemented image classification in their app but uploading 1000s of images to the cloud requires a strong internet connection because computation is done on Google's server.**

***Keywords*— Classification, Small VGGNet, deep learning, CNN, computer vision.**

I. INTRODUCTION

Classification is one of the interesting and primary fields in computer vision. In image classification, deep learning plays the important role in grouping similar images. Before feeding the image to the trained model certain changes must be made to the images like normalization, image-resizing, grey-scaling.
After pre-processing the image, the next task is to extract features from the images, draw the boxes around the objects in the image, and finally classify the images based on the detection of objects in the images. In nutshell, classification is an effortless task for humans and a challenging task for machines. Because classification is a component of supervised machine learning, we will train the model using labeled data. In supervised machine learning, both the input and output are known (for example, if we have a cat image(x), we will label it as cat(y), where x denotes the self-determining variable and y denotes the reliant on the variable). The trained model consists of predefined patterns that are compared with an object that resides in images to classify to the suitable categoryConsider a scenario in which we need to categorize 1000 images of animals into a suitable category. If we use any application, GUI, or non-GUI, we will require a large amount of bandwidth to upload the images to the cloud, where computation occurs. Instead, we will provide the trained model with an application with a simple graphical user interface that will classify more than 1000 images at once, create a folder corresponding to the label, and copy the images to the matching folder. Instead, we will provide the trained model with an application with a simple graphical user interface that will classify more than 1000 images at once, create a folder corresponding to the label, and copy the images to the matching folder.

We aim to discover hidden patterns in the dataset using machine learning and deep learning algorithms. which could help us correctly identify data points that our algorithm hasn't seen yet. Classification is the systematic grouping and categorizing of objects based on their characteristics. By using data to train the algorithm, image classification was created to bridge the gap between computer vision and human ideas. Image classification is accomplished by categorizing the image according to the content of the vision.
In this context, we will investigate image classification using deep learning. A few years ago, we used machine learning, a subset of artificial intelligence, to achieve image classification.
The main disadvantage of computer vision is that it can only retrieve a limited set of structures from images while unscrambling and is incapable of extracting distinguishing functionalities from the training data set. A deep learning model is being developed to decompose knowledge with a homogeneous structure in a way that is close to how humans think and act. Deep learning does this by combining many algorithms into a stacked structure known as an artificial neural system (ANN) or a neural network.
Neural networks are used in machine learning to execute operations by processing a training set. Thousands or millions of correlation nodes make up a neural network.

The vast bulk of those nodes is "feed-forward," meaning data flows only in one stream. Each single nodes collect data from different nodes and send it to other nodes for processing. When the model is learning at the initial stage, we will assign arbitrary values to the node weights, when training data flows continuously to the neural network, the node weights are adjusted automatically after each iteration till the output of that neural network is precise.

II. LITERATURE SURVEY

Neural networks are called computational or Mathematical models that are used to find an optimal solution. They're made up of neurons, which are the fundamental computational units in neural networks. Artificial Neural Network is another name for it (ANN). ANNs come in a variety of shapes and sizes. The convolutional neural network, or ANN, is a software program that mimics the workings of human brain neurons and networks. Most neural nets are highly successful at their intended functions, such as segmentation and sorting, and mimic their more highly complex peers.

Feedback ANN - The contribution of feedback ANN, which is the output of individual neurons, is injected back into the network so that the model accuracy increases with each iteration. Since it incorporates information back into itself, the feedback network is suitable for solving optimization problems. A feed-forward network is a basic neural network that has one or more layers of neurons and an input layer, an output layer, and one or more layers of neurons. The network's strength can be seen by going over its input and evaluating its output based on the associated neurons' group actions, and the output is determined.

The image classification process consists of two steps: training the system and testing. The training process essentially takes the distinguishing characteristics of the images (forming a class) and creates a unique description

III. RELATED WORK

The challenge of image bracket from a large dataset is the subject of a recent exploration paper by Jianxin Wu etal. (1). In image bracket, the support vector machine (SVM) classifier has proven to be veritably effective.

According to the paper by Fuliang Wang and Feng Wang etal.

(2), Artificial Neural Network is able of representing AND, OR, and NOT while efficiently handling noisy data. Also, Monica Bianchinietal.

(3) also bandy the artificial neural network bracket technique. Monica Bianchini etal.

(4) go over the artificial neural network bracket technique as well. SerafeimMoustakidisetal.

(5) describe a new fuzzy decision tree in which knot demarcation are enforced using double SVMs. Lizhen Lu etal.

(6) developed the Decision Tree classifier, which divides the input into orders to determine class class.

A Spatial – Contextual Support Vector Machine for Ever Tasted Image Bracket is bandied by Cheng-Hsuan Li etal. (7). Different image bracket styles have their own set of benefits and downsides. In image bracket, some styles combine two or further classifiers. However, it's allowed to be more effective if a classifier can rightly prognosticate. The birth of a pattern or point from the available input datasets requires image bracket.

IV. IMAGE CLASSIFICATION STEPS

Image Classification includes the following steps:

a) **Image Acquisition:** collect images for post-processing

b) **Image Pre-Processing:** Image pre-processing techniques include image transformation, noise removal, and atmospherically correction

c) **Image Feature Extraction:** Extracting the image pattern is the most important feature. Classification: Using appropriate methods that compare the image pattern to images in the database, the images are classified into predefined categories based on extracted feature

1.Reducing the dimensionality of an image to the 1D (Single array) helps to feed the network easily.

2.Dividing the image pixels by 255, we will get values in 0's and 1's, this is done to normalize the image

3.For categorical values, we use a one-hot Encode function to represent categorical values in numerical form

4.Define the model architecture, it can be a sequential model with n-dense layers

5.Create a model and make predictions with it.

i. IMAGE CLASSIFICATION METHODS

The following approaches are used to classify images:

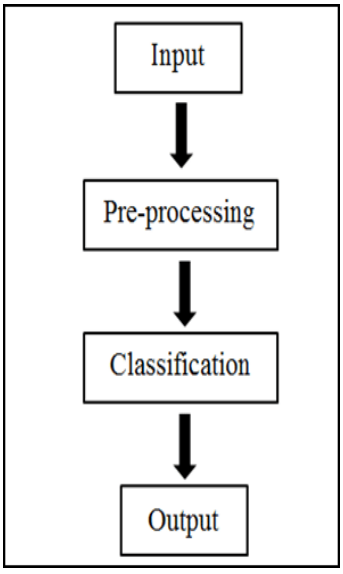
1) Support Vector Machine: In a high-dimensional region, this approach generates a series of hyper-plane that can be used for classification or regression. The hyperplane's excellent separation. SVM employs a non-parametric approach with binary classifiers to handle more input data efficiently. The accuracy is determined by the hyperplane used. The structure of the SVM algorithm is more complicated than that of other methods. Therefore, there is a lack of accountability in the results.

2) Artificial Neural Network (ANN): An artificial neural network is a form of artificial intelligence that mimics some of the functions of the human brain. An ANN is made up of several layers. Neurons are the building blocks of a neural network scheme. Weighted connections link neurons in all layers to neurons in the layers above and below them. The accuracy is determined by the number of inputs and the network structure. The ANN process is a non-parametric approach. This approach classifies the feedback quickly, but the training process takes a long time. It's tough to choose the best architecture.

Table 1: Advantages and Disadvantages of image classification methods

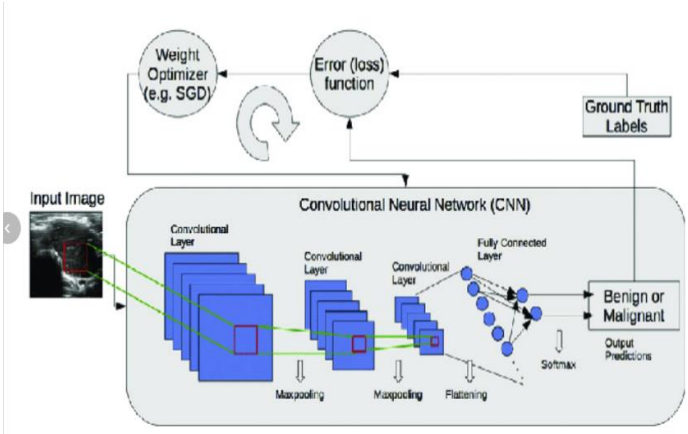
Method	Advantages	Disadvantages
1.Support Vector Machine	• Deliver unique solution. • Very efficient than other methods. • Avoid over-fitting	• High algorithm complexity • Run slowly
2. Artificial Neural Network	• Robust to noisy training dataset • Very efficient for large dataset	• High computational cost • Lazy learner
3. Decision Tree	• Require little efforts from users • Easy to interpret and explain	• Splits are very sensitive to training data set • High classification error rate

3) Decision Tree: A decision tree is a graph of choices that resembles a tree. The decisions that must be taken care graphically represented by each branch. It is a non-parametric supervised approach. It splits the input into groups that are all the same. At each intermediate point, this approach allows for the approval or rejection of class marks. After classification, this approach gives a set of instructions that must be followed.



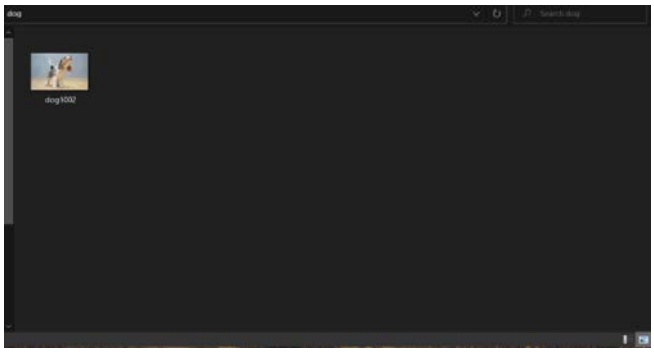
Demonstration
i)Input image:

ii)Internal processing of image: -



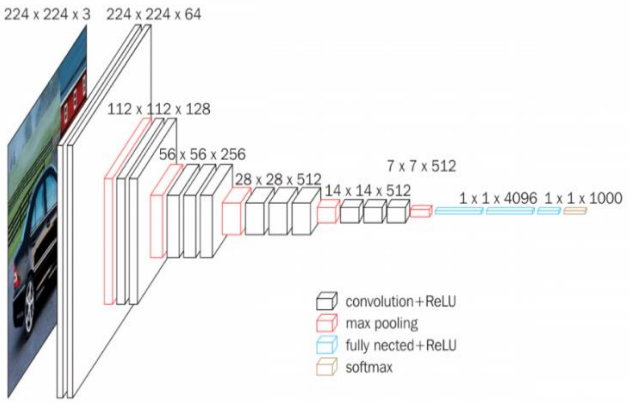
Output: -

- Detection



- Automatic folder creation based on the detected image

- **Adds the detected image to the appropriate folder**



iii) Small VGGNet Architecture

Input: - VGG accepts an RGB image with a resolution of 224x224 pixels. To maintain the target image size constant for the ImageNet contest, the programmers cropped out the central 224x224 patch on each image.

Convolutional Layers: -The receptive area of VGG's convolutional layers is extremely tiny (3x3, the smallest size that captures

in all directions). Several 1x1 convolution detectors convert the input into a linear form before moving it through a ReLU unit. To retain image quality after convolution, the convolution stride is set to 1 pixel.

Fully connected layers: -VGG includes three completely connected layers, one in each class, with 4096 channels in the first two and 1000 channels in the third.

Hidden layers: -VGG's hidden layers all use ReLU (a huge innovation from Alex Net that cut training time).In any CNN, training time and memory consumption are important things that are to be considered, so to avoid this problem VGGNet doesn't use Local Response Normalization (LRN) because it causes problems also and doesn't improve accuracy.

ii) CONCLUSION

This paper explains how image classification works. We implemented a method that uses a convolutional neural network to extract and select essential features from any given image and classify the images into appropriate categories. In comparison to other classifiers, the Convolution neural network may have high precision. On both basic CPUs and GPUs, consistency and accuracy are evaluated. As a result, we've decided that Convolution Neural Networks are a safer choice for image classification. This system may be used for biometric identification, for example.

Finally, this study is about image classification using deep learning via the Keras framework. It has three objectives that have been met throughout this research. The conclusions are inextricably tied to the objectives since they can assess whether all the objectives have been met. All the data obtained were extremely amazing, it is feasible to conclude. This study focuses on the deep neural network (DNN), which is particularly useful in picture categorization technologies. Beginning with the construction, training model, and classification of photos into categories, the DNN technique was examined in further depth. Epochs' functions in DNN allowed for precision control while also preventing issues like overfitting. Deep learning implementation utilising the Keras framework also produced positive results, as it is capable of simulating, training, and categorising five different varieties of flowers with up to 90% accuracy. Finally, Python was chosen as the programming language for this study because it is compatible with the TensorFlow framework, allowing for Python-based system creation from start to finish.

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Deep Food: Food Image Analysis and Dietary Evaluation through Deep Model

Venkatesh G
Lavanya G
Nayana R
Varshitha B S
Pooja D

anku777g@gmail.com
lavanayag2523@gmail.com
nayana.r@reva.edu.in
varshabahadhur491@gmail.com
poojadiwan144@gmail.com

***Abstract*: -**Food is crucial for individual survival, it takes long be there a source of concern for medical professionals. New salutary evaluation and aliment examination technologies are now available, furnishing further openings for people to more understand their diurnal food patterns. By chancing contender areas and employing profound convolutional brain organization (CNN) for item characterization, we suggest a three- adventure calculation to precinematic-thing (food) prints. Using the Region AdvanceSystem attained from the Quicker R-CNN model, the frame first constructs several locales of proposition on input images. It then detects every recommended location by arranging them into highlight guides, categorizing them into distinct food classes, and locating them in the initial photos. Finally, based on the acknowledgement results, the framework would like research the healthy fixings and generate a nutritional evaluation report by calculating the number of calories,carbohydrates. Different assessment measurements are utilized to evaluate the prototype. The analysis results suggest that framework can preciselyrecognize food things and generate a dietary appraisal report, which leave customers a clear understanding of excellent nutritional advice and direct their day-to-day routine to further increase their body welfare and health.

***Keywords*: -**Food figuring, wellbeing, dietary evaluation, nourishment examination, picture acknowledgment, PC idea.

1. INTRODUCTION

Classification to the World Health, fatness and overweight are described as irregular or unneeded body fatgrowth that puts one's comfort at risk. Until now, no single country has had the opportunity to reverse it. the annual clinical cost of obesity-related diseases medical services, such as heart disease and diabetes, Kind 2 diabetes and specific kinds of disease cost an incredible 190.2 billion dollars, and the clinical price for those who are overweight is $1,529 greater than for people who are normal weight. Moreover, a variety of factors can contribute to weight growth, including specific medications, severe topics such as stress, decreased activityand eating habits - how people eat is often the significant issue indicates to weight gain.

Energy proportions are represented by calories, as well as other food components such as fat, carbohydrate, and protein. Another reason is that more people may want to keep track of what they eat and how much nutrition they get on a regular basis to see if they are eating healthy. For this strategy to work, an exact estimate of dietary caloric admission is required. Furthermore, the virtual entertainment client experience is enhanced by the rapid growth of the Internet of Things (IoT) and the stream of data.we in this study, we look into a comprehensive pattern-builtmethod to food identification and food evaluation. In example, we outline and carry out a methodology for food picture analysis, with aim to determine how much healthy elements each food item contains from photographs taken daily. In context of what you eat at lunch, an extensive dietary study report will be made.We have an impact on food localization and identity models that use deep convolutional neural circuits. Right away, we employ district proposal organization to generate many district recommendations from the data. Then a best-in-class profound convolutional neural network was used to remove element plans from everyproposition and categorize them as various food objects. We use a relapse module to find every food item in the image to reduce handling time.

2. LITERATURE SURVE

A.GEOMETRY FEATURES IN FOOD RECOGNITION: In the average diet, food type detection and verification has long been a major research topic. In any event, it's a hassle because food products are essentially malleable materials with a wide range of variations. Food products can have a lot of intra-class variance (similar foods like hamburgers and steaks can look

radically different depending on how they're cooked) or a lot of between-class variation. Various ways for recognizing food items in photos have been proposed using math elements such the filter descriptor, variety histograms or GIST, and form setting. Felzenszwalb likewise uses triangulated polygons to create a changing shape for recognition. Jiang et al. further proposes learning a mean state of the target class in light of the delicate plate spline parametrization. Balgonie also chooses n pixels from a shape's forms and creates n 1 vectors as a pixel-level representation of the shape. While calculating highlight-based algorithms work well for specific sorts of products in object detection, there are two key issues with food-related errands. The key difficulty is that math-based algorithms must recognize elements like edges, counters, and core concerns, as well as milestones, which are not always obvious in food images.

B. METHODS FOR FOOD RECOGNITION BASED ON STATISTICAL HIGHLIGHTS: Approaches based on measurable highlights are presented to address the challenges shown above. Rather of focusing on edges or critical spots, the techniques focus on measurable highlights in the neighborhood, such as groupings of pixels. Because the measured transmission of paired neighboring highlights could distinguish significant shape qualities and spatial linkages between food fixings, working with more preciseoutcomes in object detection was possible. Yung al., for example, use a multi-step discriminative classifier to study the spatial relationships between various fixes. Every picture element in the image is given vector that shows how likely it is that the pixel will have a spot with nine food fixings.

C. MACHINE LEARNING METHODS FOR FOOD RECOGNITION: In current times, here has happened an increase in the amount of investigation-led trials as well as investigations into the disciplines of meal order, applying AI/deep learning calculations. In addition, experts continue to examine whattypes and stylesis more ideal for food detection, and then include them into a food inspection framework to compute calories. Convolutional brain networks are used for concurrent knowledge of food calories, classes, and fixes to calculate food calories from a food image and do other tasks. In addition, for food image analysis, a generative antagonistic organization strategy is provided. However, even though food recognition and sustenance content analysis havebeen thoroughly investigated by previous studies, two major challenges remain. Right away, most approaches deal with a single food item in a picture. In addition, recognizing and grouping food in photos takes time (2 seconds in total). We hope to tackle these challenges in this research, as well as present a programmed food recognition framework for distinguishing food from photos and producing dietary evaluation reports for long-term medical services. Cheng-Hsuan Li et al. propose a Spatial – Contextual Support Vector Machine for Ever Tasted Image Bracket. Each picture bracket style has its own set of advantages and disadvantages. Some styles in image bracket integrate two or more classifiers. However, if a classifier can correctly predict, it is allowed to be more effective.

2. METHODOLOGY AND DATASETS

• In this study, we propose a deep studying methodology for food item detection, as well as a breakdown of the nutrition components of each dinner image. Our model has three key improvements.

• We start by concentrating the districts of interest using the Region Suggestion Network from the Faster R-CNN model (ROIs). The Roi's would aid in separating the food items from the foundation and improving the identification model's efficacy.

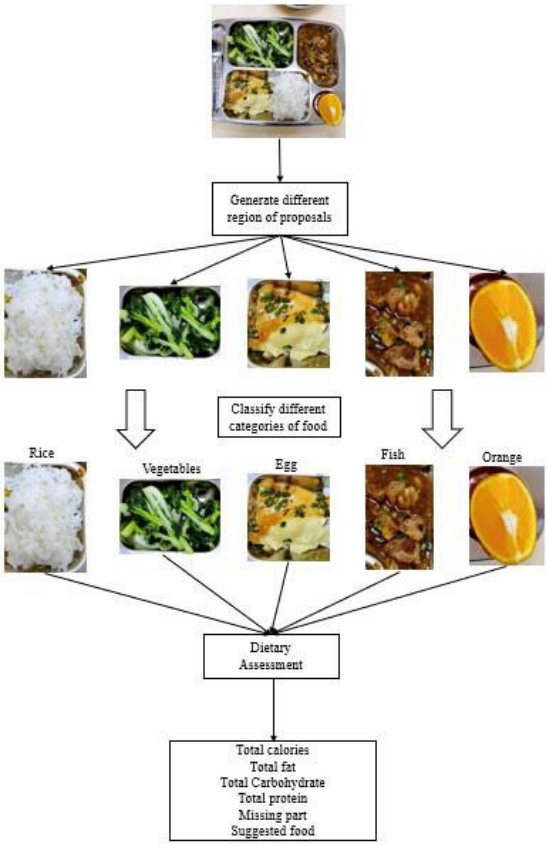


FIGURE: The food acknowledgment and nourishment assessment framework are set up in three stages.

- The next step is to classify selected RoIs into different food item groups using an all-around designed Convolutional Neural Network (CNN). Meanwhile, the food arrangements in the image are located using a relapse module.
- Finally, cutting-edge innovation-based dietary evaluation devices will be used to examine food nutrition and generate a health report for clients based on their dinner photographs.

Object recognition precision is driven by area-based object identification algorithms. It proposes several areas from the information picture and organizes them into distinct groups as a manner of characterizing things. A sliding window goes through the picture in traditional locale-based object protest techniques. A process like this, which is created by hand, is It takes a long time because of the computational weight of proposition age. Ren and his colleagues. To overcome this issue, researchers developed Faster R-CNN, a method for making location proposals more productive. The district proposition (secures delegated foreground locale foundation area).The four main components of the Quicker R-CNN are bouncing box regression (an essential convolutional module with convolution layer, relu enactment work, and pooling layer), element extraction (an essential convolutional module with convolution layer, relu enactment work, and pooling layer) (fix the anchors area), and grouping.

CLASSIFICATION OF FOOD ITEMS

The grouping module uses the maps generated for characterization to compute the score for each class in the proposal. At the same time, it employs bouncing box relapse to improve proposition local confinement precision. In this work, we use VGGNet as the Classification algorithm to remove the ingredient supervision of the indicated locations and conduct food identity classification. In the characterization module. We'll also tweak the structure of the layer for different datasets with varied amounts of food classes. Additionally, before being employed with the food picture datasets we propose, all deep networks used in this study will be which was before using conventional picture datasets.

REGRESSION ON THE BOUNCING BOX

The reason for the bouncing box relapse is that we may not be able to suggest an area that completely covers the article. In this case, we'll need to fine-tune the underlying bouncing box to match the ground truth's directions.

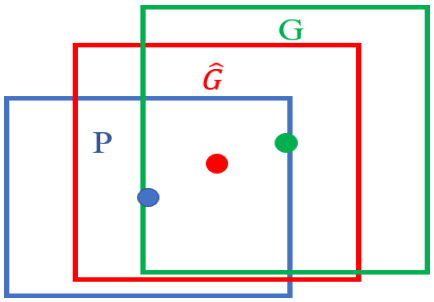


FIGURE:REGRESSION ON THE BOUNCING BOX

ANALYSIS OF YOUR DIET

Following the recognition of food stuffs, the system is expected to undertake a dietary analysis that dissects the feast's nutrients. The purpose of this study is on measuring the carbohydrates, fats, carbs, and proteins in each diner photo. Additionally encouraged are vegetables, nuts, and whole grain foods. The structure is useful in concrete world. should gather information on their bodies, such as age, gender, weight, activity level, and so on.

we canselect the ideal proportion of food and energy they demand according on individual profile in maintain a healthy way of eating. Clients can simply take a photo of what they consume at the feast using their smart phones (obviously before gobbling them up). The methodology will evaluate the food in the pictures and then assess the meal's nutritive quality. An eating routine log will be made for simple following and remind clients to work out the number they left. Our food sustenance reference table is depicted in Table 1. We accept a weight of 400 grammes for every food item.

Food(400g)	Calories	Fat(g)	Carbohydrate(g)	Protein(g)
Steak	1365	63	0	187.3
Ramen	760	29	78	35
Miso Soup	81	3.3	9.8	6.5
Fried Rice	619	12.8	106.8	12.8
Sushi	536	7.7	103.3	13.4
French Fries	428	21.4	57.1	4.8
Takoyaki	1264	92.8	67.2	38.4
Pizza	690	20.4	103.9	26
Hamburger	1086	73.7	0	99.1
...				

TABLE 1: A section of the table of reference for subsistence realities. Each line contains the calorie, fat, carbohydrate, and protein values.

This is a normal serving size for a single person. Each column in the reference table shows how many calories, fat, carbohydrate, and protein the food contains. The UEC-FOOD100 dataset contains 100 food classifications, hence the table will have 100 lines. Based on the client's profile data, we can supply an eating routine adding machine. For a 24-year-old woman who weighs 60 kilo grammes and stands 170 centimeters tall and has a moderate action level, an acceptable daily calorie intake for a healthy diet would be 2399 calories, 311 grammes of starch, 109 grammes of protein, and 80 grammes of fat.

METRICS OF ASSESSMENT

Our identification model is evaluated in this research using mean Average Precision (map). Because there are two distinct errands to gauge simultaneously, assessment isn't as simple as different models, as it is in food item identification.

• Arrangement - Identifying whether an object appears in the image.

• Relapse - Identifying the item's location.

Similarly, there are various food classes with unequal distribution. An inclination could be shown by a simple measurement used to estimate exactness. A "certainty score" coupled with each bouncing box could help with standard evaluation in this way.

3. TEST SETUP

1) PLATFORM FOR EXPERIMENTATION

We use Kera's, which is a python-based level brain network API, to run our complex model. In the backend, we employ Google's TensorFlow stage [12].

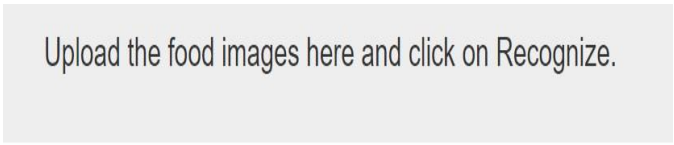
RESULTS OF THE TESTS

1) SETTINGS FOR BASELINES AND EXPERIMENTATION

We chose two pattern standards for food discovery: R-CNN and a CNN-centered. food picture division model. To provide a reasonable correlation, we follow the environment parameters as Shimada's work. We divided the dataset UEC-FOOD100 into two parts: preparing information (80%) and testing information (20%), with an energy and a weight rot pace of 0.005.

2) FINDING RESULTS and DATASET UEC-FOOD100

We are unable to match the pattern Indeed model's setting of 40000 cycles due to the constraints of our processing asset. As a result, Figure depicted the training challenge for the first 239 years of preparation.



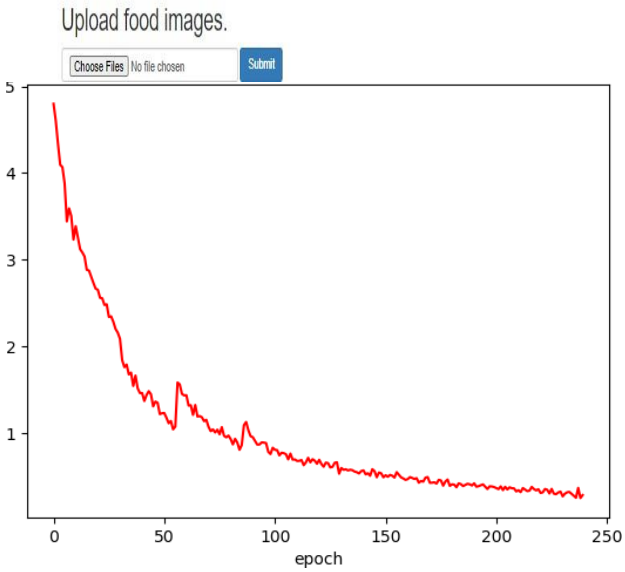


FIGURE: During the preparation of the UEC-FOOD100 dataset, preparing for misfortune for the 239 ages.

The mAP of 1000 food lessons in dataset is determined. Regardless, we chose 53 food classifications that have been explored to contrast with the pattern model. Every classification has about ten pictures, and the top eleven classifications have more than 50 pictures. The findings of the UEC-FOOD100 project. We get model outcomes from the first paper/report. Table 3 reveals that our suggested model outperforms the R-CNN model in specific food classes despite having much fewer emphases in instructional meetings. The better-performing set (Set 3 vs. Set 1) is due to something else in the dataset. Our model could reach significantly higher precision with such a vast dataset and additional preparation information.

DATASET FOOD20-WITH-BBX

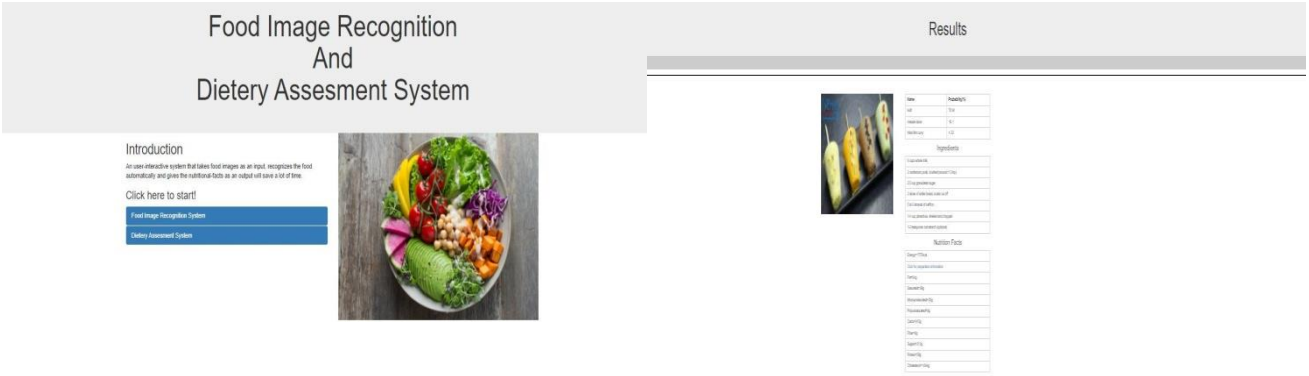
Moreover, we test our model using FOOD20-with-bbx, a self-adjusted dataset. The FOOD20 database contains a huge number of pictures of western dishes that can be used to evaluate the model's robustness. For FOOD20-with-bbx, we chose 20 food classes that were limited by the bouncing boxes with arrangements. We employ a model that has been pre-trained using the

UECFOOD100 dataset to save time. The information from 80% of the FOOD20-with-bbx image tests was used in the instructional course, while the remaining 20% was used to look at the mAP values. The investigation's findings are presented in Table 5. In the FOOD20-withbbx dataset, our suggested model could obtain 71.7 percent main 1 precision and 93.1 percent top-5 exactness with 500 emphases.

# of iteration	Top-1 accuracy (%)	Top-5 accuracy (%)
100	28.8	61.1
250	43.6	81.2
500	71.7	93.1

TABLE 2:FOOD20-with-bbx results.

RESULT SNAPSHOTS



4. CONCLUTION AND FUTURE WORK

Using profound learning strategies, we address the topic of food recognition and dietary evaluation in this work. To obtain a greater understanding of object detection and food investigation, we use a cutting-edge considering current innovation-based nutritional evaluation gadgets, we explore the endurance of noteworthy food and summarize the feast report.We conduct extensive studies to assess our framework's proficiency and appropriateness. Our proposed structure achieved comparable implementation, indicating that it has the potential to promote sound nutritional and believable advice. Later, we would continue working on improving the precision of our location framework and reducing handling time. A more complete dietary examination strategy, such as substance prognostication, is appealing. Furthermore, a pre-programmed diet number cruncher is included in the arrangement to ensure a healthy eating routine.

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Movie Recommender System

Namratha Shridhar[1], Poorna B S[2], Prakruthi N [3], Preethi S[4], Prof. Pallavi Biradar[5]

[1, 2, 3, 4] School of Computer Science Department, Reva University, Bangalore, India.

[5]Assistant Professor, Reva University, Bangalore, India .

Abstract

A recommender system is always an important factor because of its ability to contribute immense entertainment in our daily lives. It is not only known for entertainment but also for saving our time by recommending exactly what we want. This system can propose movies for the customers depending on their interests or depending on ratings. In this, we propose an engine that suggests movies to existing as well as new users efficiently. When the user attempts to use this system, the main purpose of this will be to mine the information stored, so that an appropriate recommendation can be made. One of the major factors considered while doing this is the previous ratings from the users. Analysis of the ratings with the help of filtering can determine what type of a movie must be recommended to that user. This system mainly focuses on Content and Collaborative Based filtering.

Keywords *- Recommender engine, Content-Based filtering, Collaborative filtering.*

1. INTRODUCTION

A recommender engine is the one that suggests or sorts preferences depending on the customer's interests. These recommender engines are used in a variety of areas like movies, sports, health, and books. Recommendation plays an important role these days because of our busy lives. Searching for something we need becomes infuriating at times. A system that could provide us with suggestions on what we need, without giving any input is highly appreciated. This system suggests depending on the ratings and previously visited genre. If there is a new user without any experience, then the engine suggests depending on the overall rating votes from the existing users. To do this, certain filterings are used:Content-based filtering and Collaborative-based filtering.

Content-based filtering is an AI-applied machine learning method which uses the experience of the user and suggests the movie. This filtering is more often applied in

referral engines, which are algorithms, developed to announce or suggest recommendations to the users. This method of filtering compares the interests of the users with the characteristics of the product. Products whose characteristics are likely to match the most with user interests are recommended. Two methods can be applied here. First, users can receive a list of functionalities from which they can select what they relate with the most. Second, the algorithm keeps in check with the items that the user has already selected and adds these functionalities to the user data profile. Equally, the characteristics of the product can be identified by the product developers.In addition, users may be questioned about what characteristics they feel most closely related to the products. This model is easily scalable because of small quantities of data. In addition, since, unlike other models, it need not compare with the data profile of other users in the engine, it can provide niche specific suggestions to that user. However, this model demands a great deal of knowledge on this filtering method from people who attribute characteristics to the items. Hence, its accuracy and precision are deeply reliable on the extent of knowledge on this method. Furthermore, content-based filtering depends to a large extent on the interests of known users. Therefore, it is limited to the extent that it is incapable of expanding the known interests of users.

Whereas Collaborative filtering uses the similarity between the customers to understand what genre they are looking for. Another feature of this system is to attain the loyalty of the users by providing relevant content and maximizing the time spent by a user on your website. This in turn helps in customer engagement. It runs by going among a big number of people to recognize a selected few people whose preferences are almost similar to those of another user. It examines their most favorite items and generates a list of product recommendations for that user.

The following are the two commonly known subtypes of the collaborative filtering method: User-based: Looks for users who have rated and reviewed products that are almost the same in the same way and then use that rating from the user to get the rating of the movie or item which is missing.

Item-based: In this particular section, we look at the codependency among the two items. With the help of the user's review for the items, this technique locates the items that are missing rating.

In the old days, there were limited options in all the fields. But things are not the same anymore. We need a system that helps us find what we need or at least suggest similar items to what was needed in order to make the best choice and fulfill our requirements.

2. LITERATURE SURVEY

[1] “A movie recommender system: Movrec”, this following paper uses collaborative filtering and provides the user to choose entities on which he/she wants the recommendation, Year:2015, 1 Kumar, 2 M., Yadav, 3 D. K., Singh, 4 A., Gupta V. K.

[2] “Combining content-based and collaborative recommendations” , this system includes two different filtering methods. He also presented an engine that is a product of both, the Bayesian and collaborative technique, Year: 2010 1 De Campos, 2 L. M., 3 Fernández-Luna, J. M.,4 Huete, J. F., 5 Rueda-Morales, M. A.

[3] “Clustering algorithms in hybrid recommender system on movielens data”, analyzes Centroid-based solution and memory based methods, Year:2014, 1 Kuzelewska.

[4] “A survey of recommender systems: approaches and limitations”, analyzes different ways used for suggesting, collaborative, and content-based recommendations. Year: 2013, 1 Sharma, 2 M, 3 Mann, S.

3. METHODOLOGY

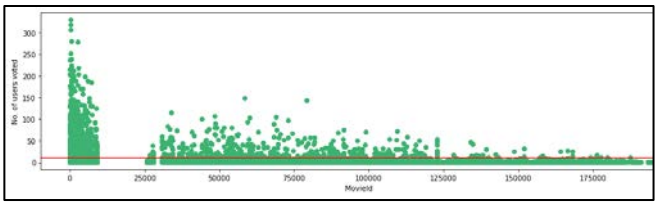
To build a system that works as a recommender the foremost thing that is required is to gather the data which is required in this engine for data analyzation. We gathered movie csv datasets from some popular streaming websites like netflix amazon prime disney hotstar and so on. Along with the movie names we also gathered the genres of those particular movies. Usually the genre of a movie helps us categorize the movies like comedy, action, romance and many more. Each movie can have one or more genres which gives so many different combinations for the user to filter from. The data also includes the existing rating of the movies from well-trusted official movie rating websites such as IMDB and TMDB; it includes the links provided from each movie from well-known streaming websites for users to watch the movie.

The second most important step while building a project is to remove the noise from the gathered dataset to prevent any faulty recommendations. Noise in a dataset is basically missing data i.e., sometimes the dataset might not contain all the data which is required for the system to work smoothly. Removing noise will increase the accuracy and the

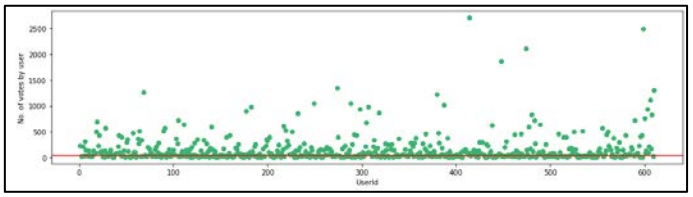
efficiency of the system output. To reduce the noise we conducted some trial and error methods and then filtered out the noisy data.

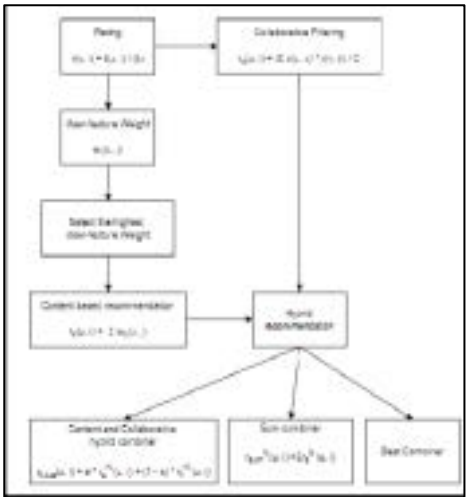
Some of the filters for the csv dataset are:

1. To consider a movie for suggestion at least 10 users should have voted for the movie.



2. To consider a user's vote they should have voted at least 10 movies.





The third step in building this model is removing the sparsity. Sparsity basically happens when a range of values of one or many more dimensions has no data for that specific dataset.

After successfully removing the sparsity of the movie csv dataset, we head on towards creating our movie recommender function. To create this function we use the KNN-algorithm i.e., the k-nearest neighbor algorithm. We have selected this algorithm, as using this can help us generate a movie list which has similar features to the movie entered as input by the user.

The working methodology of this function is rather very simple, first we take the input entered by the user and check if that input is actively there in our movie csv dataset. If the given movie is present in the csv dataset we then use this particular algorithm to find movies that are similar which are present in the csv dataset. The algorithm considers most of the parameters in the movie csv dataset such as the rating genre year of the movie and so on.

```
In [13]: get_movie_recommendation('Iron Man')
```

Out[13]:

	Title	Distance
1	Up (2009)	0.368857
2	Guardians of the Galaxy (2014)	0.368758
3	Watchmen (2009)	0.368558
4	Star Trek (2009)	0.366029
5	Batman Begins (2005)	0.362759
6	Avatar (2009)	0.310893
7	Iron Man 2 (2010)	0.307492
8	WALL·E (2008)	0.298138
9	Dark Knight, The (2008)	0.285835
10	Avengers, The (2012)	0.285319

4. CONCLUSION

In this paper we talk about the movie recommender engine. This system recommends movies depending on the users' likes and dislikes. It takes the data from different users like the ratings and comments on the movie, based on this the recommendation engine suggests a movie that suits more for the user. The system has a dataset of various movies, genres, cast and ratings which is used to help the user to pick out a movie close to their search. The main goal of this paper is to provide a time saving and good movie recommendation for the user and not disappoint them. Users must feel the ease

of using the system and get a good output from it. By recommending a movie faster the user is being entertained and can have a good experience.

ACKNOWLEDGEMENT

We are glad to have this project completed successfully. It is very important to acknowledge everyone who has helped us complete this project.

Firstly we are thankful to our guide Prof. Pallavi Biradar, Reva University for her guidance in this project.

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Lastly we are thankful to the project coordinator prof raghavendra reddy for his support in coordinating everything regarding the project.

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Analysis of Women's Safety in Indian Cities Using Machine Learning on Tweets

Vijeth M
vijeth.5448@gmail.com
Reva University

Kirana G Y
kiranpatil9611@gmail.com
Reva University

Kiran Kumar B Hiremath
kiranh.2312@gmail.com
Reva University

Jayanth P
jayanthjeshu@gmail.com
Reva University

Prof. Thirumagal
thirumagal.e@reva.edu.in
Reva University

***Abstract*— From many decades women and girls have been facing a great deal of violence and harassment in many public areas of our country. From stalking to sexual harassment there would be a case regarding it daily. Here in our project, we focus on the function of social media in enhancing women's safety in Indian cities, here particularly we use Twitter platform. This project also focuses on how people of our country can establish a sense of responsibility in the safety of women in their environment. Twitter is one of the great platform that are widely used by the people and women to express their feelings about how they feel in their society for various activities such as travelling or surrounded by unknown peoples. Many people of our country, including media people and government institutions, are spreading the newest information and viewpoints on this issue. In this study, twitter data was extracted from the Twitter social media platform using the Python programming language and the Tweepy module is used to connect the twitter API and sentiment analysis was performed for those tweets collected using textblob, and then it was further analyzed.**

Keywords-component: Sentimental analysis, Twitter, TextBlob, Nltk, Tweepy.

I. INTRODUCTION

There are particular very aggressive kinds of harassment and violence, such as outstare and commenting, these intolerable actions are considered to be a normal scenes of a city. There have been various research that took place in many places of India, where people report sharing comments about the sexual harassment and other unidentified individuals. According to a survey conducted in India's most popular metropolitan areas such as Delhi, Mumbai, and Pune, 60% of women are at risk when going to work or using transport vehicles. In other words, you can walk around freely at any time, whether it's an educational institution or wherever a women feels to go. However, women sense unsafe because they feel embarrassed and harassed by multiple unfamiliar eyes, such as in malls or on their way to work.
The fundamental reason for girl harassment is a lack of safety or real consequences in the lives of women. There were many instances where women have been sexually harassed by their own neighbors when going to school, or where there has been a lack of safety that has created a sense of fear in the minds of small girls who have suffered throughout their lives as a result of that one incident where they were forced to do something unacceptable or were sexually harassed by one of their own neighbors or any other unknown person.

Safety of women in city is approached from the stance of women's rights, allowing them to influence the city without fear of violence or sexual harassment. Rather than imposing the restrictions that usually society imposes on girls, it's the duty of the society to understand the necessity for the safety of women and recognize women have the same right as the men has the safety, yet society has failed to recognize this.

Twitter is the most viable online entertainment stage to perform opinion examination. The kind of happy shared on every web-based entertainment stage differs with the highlights given by it. Facebook is a stage where the substance shared is now and again enormous in size and subsequently isn't reasonable for examination. Instagram is a site where the substance shared mostly centers around pictures and recordings as opposed to message. Consequently, when contrasted and the other web-based entertainment stages Twitter is the most appropriate systems administration stage since the substance shared on twitter is primarily text and emoticons. However, the substance from twitter is likewise not organized and not in the necessary structure for examination, it very well may be cleaned and handled effectively before use making it more appropriate than others.

Inspection of Twitter's text data also includes the names and the time of people who oppose sexual harassment and immoral behavior by men in various places of India. Repository on the status of women protection in Indian society, obtained via Twitter, are processed by machine learning algorithms, stripped of null values, analyze the data, and remove retweets and redundancy. We have developed a method to remove tags and smoothed the data. The data from the resulting dataset provides a clean and understandable picture of the safety status of women in Indian society.

We will primarily focus on the importance of the social media in boosting safety of women in India, where we primarily focus on the Twitter platform. We also ensure that following the end of this project, women and girls will have a better understanding of Indian cities.
With the use of social media, we can learn about the least safe places in our country and then educate people in that region to increase women's safety. As a result, we will make this world a better place to live for women.

II. LITERATURE REVIEW

[1] Here the author has introduced the sentimental analysis which is a method to recognize the emotion contained in the messages that are present in any virtual platform. It includes extracting keyword related tweets posted on Twitter. They have used the keyword #WorldEnvironmentDay to collect their dataset. They have used qualitative analysis software NVivo Pro 12 to arrange the sentiments as positive, negative, or neutral tweets.

[2] Here the author has done sentimental analysis which uses a python library in which testing, and training of data will not be required, so that the time consumption is less, hence we came across the new idea that is using a library called textblob. Before entering into textblob process, the collected tweets will be filtered that is all the unwanted tweets, emojis will be removed and in the textblob the tweets will be analyzed whether the tweet is positive or negative or neutral.

[3] The work in this paper is focusing on women and their safety them in various places. The method in this paper includes the use of social media Twitter which is a platform. It's used so that the user can get to know a clear idea of how safety works in the particular city. AI calculations were studied throughout the project. AI calculations are useful for sorting and investigating the tweets to classify.

[4] The vital part of this paper is to search the less secure states in Indian cities, hence they can use social media to educate people in the region to encourage women's safety. From which it will help to make this world a better place for women. Here the author focuses on efficiency analysis using three machine learning algorithms: Naive Bayes, Random Forest, and Support Vector Machines (SVMs). Here, they have got more accuracy by using the SVM algorithm. However, it takes time to train and test the model here.

[5] In this paperwork, they have taken Tweets collected from the twitter API as their database which they have used it as their input database, then preprocess those data sets (remove incomplete and noisy data) then they have applied feature extraction method finally used Naïve Bayes classification. This module has proposed an approach to detect sentiments on tweets using Naive Bayes classification
This classification method has low relevance for new information .

[6] Here the authors have used word embedding and lexicon-based application to classify the twitter data collected from the twitter API using tweepy. The collected dataset is taken as an input and then they are preprocessed by removing stop words, hash tags and other unwanted characters. Thereafter, the resultant text is tokenized & then processed with word embedding process to detect the location and lexicon-based method to find the emotion and sentiment of the tweets. But here Only Finite number of words in the lexicons are there.

III. SYSTEM REQUIREMENTS

The hardware requirements to run everything smoothly are as follows:

- Win 10 64bit.
- Min 4GB RAM/ Recommended 8GB.
- i5 8th Gen/ Ryzen 2nd Gen.
- Language: PYTHON.
- Tool: PyCharm.

IV. METHODOLOGY

In this project we have used python as a programming language and PyCharm as IDE to carry out the analysis. Before performing the sentiment analysis, we are required to install some required libraries. The required libraries can be installed using the following commands:

a. pip install tweepy

b. pip install matplotlib

c. pip install Django

d. pip install textblob

Tweepy is an open-source, easy-to-use Python package for accessing the Twitter API. Provides an interface for accessing API from Python applications.

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI

Django is a high-level Python-based free and open-source web framework that enables rapid development of secure and maintainable websites. that follows the model–template–views architectural pattern. It is maintained by the Django Software Foundation.

TextBlob is a package of python language for processing textual data. It has many in built functions to process common natural language processing (NLP) tasks such as Noun phrase extraction, sentiment analysis, classification, translation, etc.

The Sentiment property from the textblob package returns a named tuple in the form of Sentiment (polarity, subjectivity). The polarity score is a float in the range
[-1.0, 1.0]. Subjectivity is a float within the range of [0.0, 1.0], 0.0 is very objective and 1.0 is very subjective.

```
from textblob import TextBlob
sentence = 'The platform provides universal access to the world best education'

# Creating a textblob object and assigning the sentiment property
analysis = TextBlob(sentence).sentiment
print(analysis)
```

Once imported, we'll load in a text for analysis and instantiate a TextBlob object, as well as assigning the sentiment property to our own analysis.

Here the expected output of the analysis is:

```
Sentiment(polarity=0.5, subjectivity=0.26666666666666666)
```

Here the polarity is more than 0, so it is considered to be a positive comment.

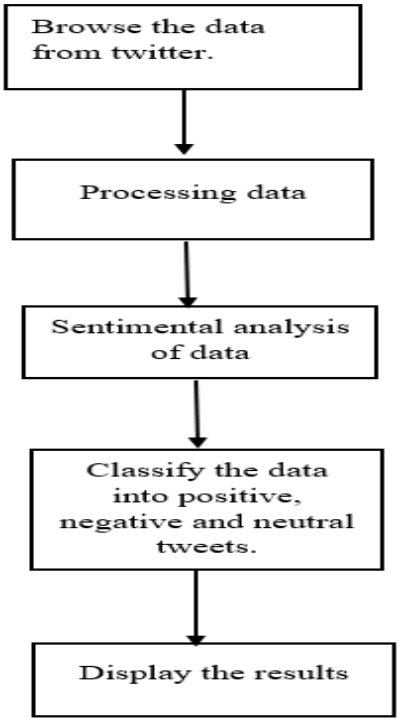
One of the great things about TextBlob is that it allows users to choose algorithms to implement high-level NLP tasks.

PatternAnalyzer is a standard classifier built on top of a pattern library.

NaiveBayesAnalyzer is an NLTK model trained in the movie review corpus.

Here we have used the default Pattern Analyzer for analyzing the sentiments of the tweets.

Analysis of the twitter data



The procedure for obtaining tweet estimations is divided into five stages:

1) ***Data Extractions :***
Here We basically connect out Twiiter API using the tweepy library and collect all the tweets from it. These are the data's which we are going to process further in our implementation part.

The Twitter API is a programming interface that provides a variety of tools for easy access to tweets. The Twitter API uses an HTTP to Get request to get a tweet.

By following these simple steps, you can easily connect to Twitter and retrieve data from Twitter.

1]. First, create / log in to your Twitter developer account.

2]. Click Create New App (enter all the required details on the Create App page).

3]. Now, the project will be created, once it is created, to get the consumer secret and consumer key click on "Keys and Access Tokens" tab. These consumer secrets and consumer keys will be used for authentication purposes.

2) ***Processing Data*** *:*
The data must be supplied to the classifier once it has been extracted from the twitter source as datasets. Here it cleans the dataset by removing unnecessary information such as stop words and emotes, ensuring that non-text-based substances are identified and removed before the study begins.

3) ***Sentimental analysis :***
Once the data is preprocessed , that is removing unwanted characters or unwanted tweets from the dataset than those resultant tweets are passed into our algorithm that is into our TextBlob python library, to analyse the sentiments expressed by the people on their tweets uploaded.

ALGORITHM:

```
1.  function Connect_with_Twitter()
2.      consumer_key = 'xxxxxxxxx'
3.      consumer_secret = 'xxxxxxxx'
4.      access_token = 'xxxxxxxx'
5.      access_token_secret = 'xxxxxxxx'
6.      self.auth = OAuthHandler(consumer_key, consumer_secret)
7.      self.auth.set_access_token(access_token, access_token_secret)
8.      self.api = tweepy.API(self.auth)
9.  end function
10.
11. function collect_tweets(tweet_count)
12.      collected_tweets = self.api.search(q=query,count=tweet_count)
13.      return collected_tweets
14. end function
15.
16. function clean_tweets(tweets)
17.     t= tweets.remove_stop_words
18.    return t
19. end function
20.
21. function classify_tweets(tweets)
22.      pre_processed_tweet = clean_tweets(tweets)
23.      tweet_polarity = pre_processed_tweet.sentiment.polarity
24.      Classify using tweet_polarity and Return value.
25. end function
```

4) ***Classifying the Data :***

Here it will classify each and every tweets present in the dataset whether it is positive, negative or neutral by using the PatternAnalyser algorithm which is pre built in python package called TextBlob. Than a separate count of these positive, negative and neutral tweets would be stored for further analysis.

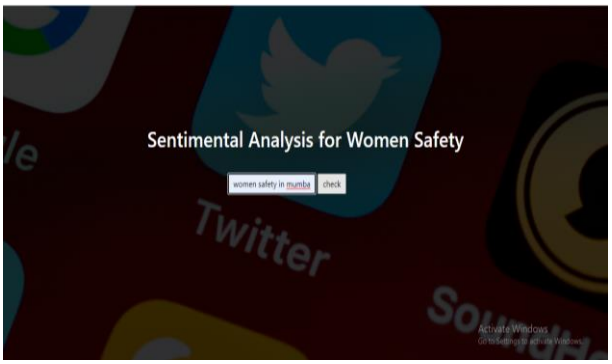
5) ***Displaying the results :***

Finally, the analysis and classification is displayed in an easily understandable manner.A graphical representation of all the classified tweets would be shown. Also the total count and the total percentile of the tweets would be displayed that is all the positive, negative and the neutral tweets present in the dataset collected.

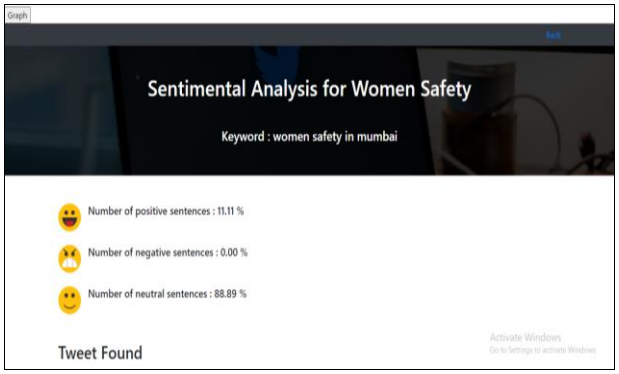
V. RESULTS AND DISCUSSIONS

With this project, we count the percentage of positive, negative, and neutral tweets by using the texblob python library for analyzing the tweets present in the dataset. Which will then be displayed graphically by using the matplotlib python library?

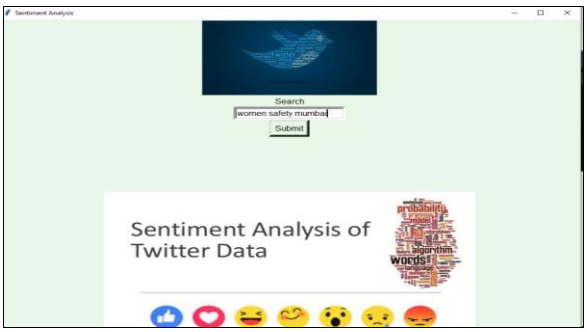
Once our project is executed the UI page that appears is as follows.



In the search bar we have to include the city name whose information is needed. Than after analysing everything in the backend the results would be displayed. The percentage of positive, negative, and neutral tweets for the keyword ‘women safety Mumbai’ will be as follows:

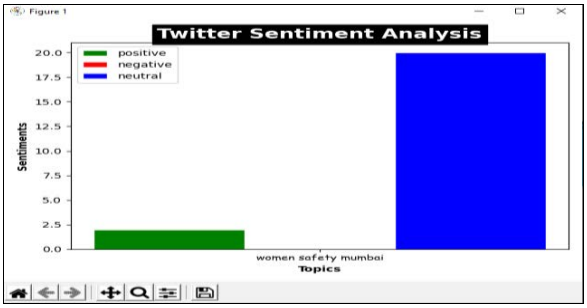


We Use the Emojis for representing Positive, Negative and Neutral tweets in our project. Also, the graphical representation will be shown for further analysis.



The bar graph indicates the percentage of positive tweets in green, percentage of negative tweets in red, and percentage of neutral tweets in blue.

The bar graph showing the positive, negative, and neutral percentages for Mumbai city is as follows:



Women and girls from outside India or different parts of India can use this website to check which city is safe for her to live in and will have a better understanding of Indian cities. Also creates awareness of which city is having more negativity of women harassment and the government can take necessary measures to overcome in that particular city and then educate people in that region to increase women's safety. As a result, we will make this world a better place to live for women.

VI. CONCLUSION

In this regard, the new technological environment, especially social media, Reflection of new technology development. Social media has become a new platform used by people, social movements, political parties, businesses, non-profits, or communities to share their opinion or concern on a particular topic.

We have discussed sentimental analysis which helps us to arrange and inspect the huge amount of Twitter dataset. The sentimental analysis using textblob is helpful and very effective when it comes to inspecting a huge amount of dataset.

Using this machine learning and social media platform, we can achieve sentimental analysis and bring more safety to women by spreading awareness. For future improvements, these machine learning technologies can be extended to apply to various web-based media platforms such as Facebook and Integral as our project work only considers Twitter.

VII. REFERENCES

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Analysis of Women's Safety in Indian Cities Using Machine Learning on Tweets

Vijeth M
vijeth.5448@gmail.com
Reva University

Kirana G Y
kiranpatil9611@gmail.com
Reva University

Kiran Kumar B Hiremath
kiranh.2312@gmail.com
Reva University

Jayanth P
jayanthjeshu@gmail.com
Reva University

Prof. Thirumagal
thirumagal.e@reva.edu.in
Reva University

***Abstract*— From many decades women and girls have been facing a great deal of violence and harassment in many public areas of our country. From stalking to sexual harassment there would be a case regarding it daily. Here in our project, we focus on the function of social media in enhancing women's safety in Indian cities, here particularly we use Twitter platform. This project also focuses on how people of our country can establish a sense of responsibility in the safety of women in their environment. Twitter is one of the great platform that are widely used by the people and women to express their feelings about how they feel in their society for various activities such as travelling or surrounded by unknown peoples. Many people of our country, including media people and government institutions, are spreading the newest information and viewpoints on this issue. In this study, twitter data was extracted from the Twitter social media platform using the Python programming language and the Tweepy module is used to connect the twitter API and sentiment analysis was performed for those tweets collected using textblob, and then it was further analyzed.**

Keywords-component: Sentimental analysis, Twitter, TextBlob, Nltk, Tweepy.

I. INTRODUCTION

There are particular very aggressive kinds of harassment and violence, such as outstare and commenting, these intolerable actions are considered to be a normal scenes of a city. There have been various research that took place in many places of India, where people report sharing comments about the sexual harassment and other unidentified individuals. According to a survey conducted in India's most popular metropolitan areas such as Delhi, Mumbai, and Pune, 60% of women are at risk when going to work or using transport vehicles. In other words, you can walk around freely at any time, whether it's an educational institution or wherever a women feels to go. However, women sense unsafe because they feel embarrassed and harassed by multiple unfamiliar eyes, such as in malls or on their way to work.
The fundamental reason for girl harassment is a lack of safety or real consequences in the lives of women. There were many instances where women have been sexually harassed by their own neighbors when going to school, or where there has been a lack of safety that has created a sense of fear in the minds of small girls who have suffered throughout their lives as a result of that one incident where they were forced to do something unacceptable or were sexually harassed by one of their own neighbors or any other unknown person.

Safety of women in city is approached from the stance of women's rights, allowing them to influence the city without fear of violence or sexual harassment. Rather than imposing the restrictions that usually society imposes on girls, it's the duty of the society to understand the necessity for the safety of women and recognize women have the same right as the men has the safety, yet society has failed to recognize this.

Twitter is the most viable online entertainment stage to perform opinion examination. The kind of happy shared on every web-based entertainment stage differs with the highlights given by it. Facebook is a stage where the substance shared is now and again enormous in size and subsequently isn't reasonable for examination. Instagram is a site where the substance shared mostly centers around pictures and recordings as opposed to message. Consequently, when contrasted and the other web-based entertainment stages Twitter is the most appropriate systems administration stage since the substance shared on twitter is primarily text and emoticons. However, the substance from twitter is likewise not organized and not in the necessary structure for examination, it very well may be cleaned and handled effectively before use making it more appropriate than others.

Inspection of Twitter's text data also includes the names and the time of people who oppose sexual harassment and immoral behavior by men in various places of India. Repository on the status of women protection in Indian society, obtained via Twitter, are processed by machine learning algorithms, stripped of null values, analyze the data, and remove retweets and redundancy. We have developed a method to remove tags and smoothed the data. The data from the resulting dataset provides a clean and understandable picture of the safety status of women in Indian society.

We will primarily focus on the importance of the social media in boosting safety of women in India, where we primarily focus on the Twitter platform. We also ensure that following the end of this project, women and girls will have a better understanding of Indian cities.
With the use of social media, we can learn about the least safe places in our country and then educate people in that region to increase women's safety. As a result, we will make this world a better place to live for women.

II. LITERATURE REVIEW

[1] Here the author has introduced the sentimental analysis which is a method to recognize the emotion contained in the messages that are present in any virtual platform. It includes extracting keyword related tweets posted on Twitter. They have used the keyword #WorldEnvironmentDay to collect their dataset. They have used qualitative analysis software NVivo Pro 12 to arrange the sentiments as positive, negative, or neutral tweets.

[2] Here the author has done sentimental analysis which uses a python library in which testing, and training of data will not be required, so that the time consumption is less, hence we came across the new idea that is using a library called textblob. Before entering into textblob process, the collected tweets will be filtered that is all the unwanted tweets, emojis will be removed and in the textblob the tweets will be analyzed whether the tweet is positive or negative or neutral.

[3] The work in this paper is focusing on women and their safety them in various places. The method in this paper includes the use of social media Twitter which is a platform. It's used so that the user can get to know a clear idea of how safety works in the particular city. AI calculations were studied throughout the project. AI calculations are useful for sorting and investigating the tweets to classify.

[4] The vital part of this paper is to search the less secure states in Indian cities, hence they can use social media to educate people in the region to encourage women's safety. From which it will help to make this world a better place for women. Here the author focuses on efficiency analysis using three machine learning algorithms: Naive Bayes, Random Forest, and Support Vector Machines (SVMs). Here, they have got more accuracy by using the SVM algorithm. However, it takes time to train and test the model here.

[5] In this paperwork, they have taken Tweets collected from the twitter API as their database which they have used it as their input database, then preprocess those data sets (remove incomplete and noisy data) then they have applied feature extraction method finally used Naïve Bayes classification. This module has proposed an approach to detect sentiments on tweets using Naive Bayes classification
This classification method has low relevance for new information .

[6] Here the authors have used word embedding and lexicon-based application to classify the twitter data collected from the twitter API using tweepy. The collected dataset is taken as an input and then they are preprocessed by removing stop words, hash tags and other unwanted characters. Thereafter, the resultant text is tokenized & then processed with word embedding process to detect the location and lexicon-based method to find the emotion and sentiment of the tweets. But here Only Finite number of words in the lexicons are there.

III. SYSTEM REQUIREMENTS

The hardware requirements to run everything smoothly are as follows:

- Win 10 64bit.
- Min 4GB RAM/ Recommended 8GB.
- i5 8th Gen/ Ryzen 2nd Gen.
- Language: PYTHON.
- Tool: PyCharm.

IV. METHODOLOGY

In this project we have used python as a programming language and PyCharm as IDE to carry out the analysis. Before performing the sentiment analysis, we are required to install some required libraries. The required libraries can be installed using the following commands:

a. pip install tweepy

b. pip install matplotlib

c. pip install Django

d. pip install textblob

Tweepy is an open-source, easy-to-use Python package for accessing the Twitter API. Provides an interface for accessing API from Python applications.

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI

Django is a high-level Python-based free and open-source web framework that enables rapid development of secure and maintainable websites. that follows the model–template–views architectural pattern. It is maintained by the Django Software Foundation.

TextBlob is a package of python language for processing textual data. It has many in built functions to process common natural language processing (NLP) tasks such as Noun phrase extraction, sentiment analysis, classification, translation, etc.

The Sentiment property from the textblob package returns a named tuple in the form of Sentiment (polarity, subjectivity). The polarity score is a float in the range
[-1.0, 1.0]. Subjectivity is a float within the range of [0.0, 1.0], 0.0 is very objective and 1.0 is very subjective.

```
from textblob import TextBlob
sentence = 'The platform provides universal access to the world best education'

# Creating a textblob object and assigning the sentiment property
analysis = TextBlob(sentence).sentiment
print(analysis)
```

Once imported, we'll load in a text for analysis and instantiate a TextBlob object, as well as assigning the sentiment property to our own analysis.

Here the expected output of the analysis is:

```
Sentiment(polarity=0.5, subjectivity=0.26666666666666666)
```

Here the polarity is more than 0, so it is considered to be a positive comment.

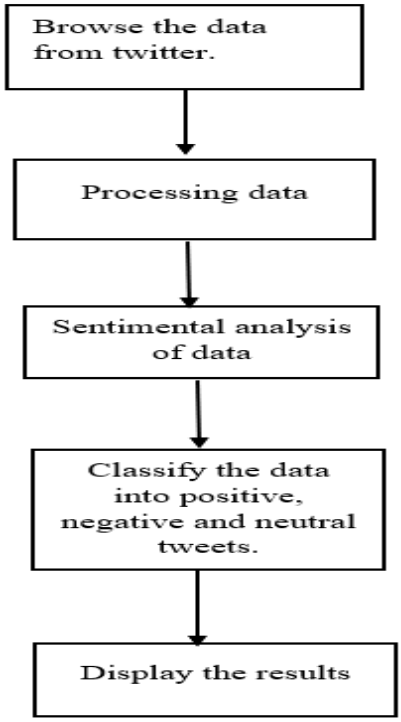
One of the great things about TextBlob is that it allows users to choose algorithms to implement high-level NLP tasks.

PatternAnalyzer is a standard classifier built on top of a pattern library.

NaiveBayesAnalyzer is an NLTK model trained in the movie review corpus.

Here we have used the default Pattern Analyzer for analyzing the sentiments of the tweets.

Analysis of the twitter data



The procedure for obtaining tweet estimations is divided into five stages:

1) ***Data Extractions :***

Here We basically connect out Twiiter API using the tweepy library and collect all the tweets from it. These are the data's which we are going to process further in our implementation part.

The Twitter API is a programming interface that provides a variety of tools for easy access to tweets. The Twitter API uses an HTTP to Get request to get a tweet.

By following these simple steps, you can easily connect to Twitter and retrieve data from Twitter.

1]. First, create / log in to your Twitter developer account.

2]. Click Create New App (enter all the required details on the Create App page).

3]. Now, the project will be created, once it is created, to get the consumer secret and consumer key click on "Keys and Access Tokens" tab. These consumer secrets and consumer keys will be used for authentication purposes.

2) ***Processing Data :***

The data must be supplied to the classifier once it has been extracted from the twitter source as datasets. Here it cleans the dataset by removing unnecessary information such as stop words and emotes, ensuring that non-text-based substances are identified and removed before the study begins.

3) ***Sentimental analysis :***

Once the data is preprocessed , that is removing unwanted characters or unwanted tweets from the dataset than those resultant tweets are passed into our algorithm that is into our TextBlob python library, to analyse the sentiments expressed by the people on their tweets uploaded.

ALGORITHM:

```
1.  function Connect_with_Twitter()
2.      consumer_key = 'xxxxxxxxx'
3.      consumer_secret = 'xxxxxxxx'
4.      access_token = 'xxxxxxxx'
5.      access_token_secret = 'xxxxxxxx'
6.      self.auth = OAuthHandler(consumer_key, consumer_secret)
7.      self.auth.set_access_token(access_token, access_token_secret)
8.      self.api = tweepy.API(self.auth)
9.  end function
10.
11. function collect_tweets(tweet_count)
12.      collected_tweets = self.api.search(q=query,count=tweet_count)
13.      return collected_tweets
14. end function
15.
16. function clean_tweets(tweets)
17.     t= tweets.remove_stop_words
18.    return t
19. end function
20.
21. function classify_tweets(tweets)
22.      pre_processed_tweet = clean_tweets(tweets)
23.      tweet_polarity = pre_processed_tweet.sentiment.polarity
24.      Classify using tweet_polarity and Return value.
25. end function
```

4) ***Classifying the Data :***

Here it will classify each and every tweets present in the dataset whether it is positive, negative or neutral by using the PatternAnalyser algorithm which is pre built in python package called TextBlob. Than a separate count of these positive, negative and neutral tweets would be stored for further analysis.

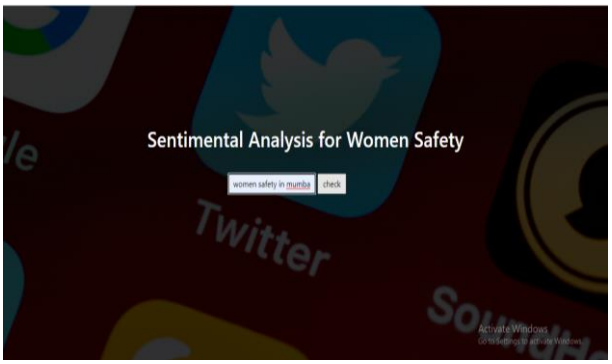
5) ***Displaying the results :***

Finally, the analysis and classification is displayed in an easily understandable manner.A graphical representation of all the classified tweets would be shown. Also the total count and the total percentile of the tweets would be displayed that is all the positive, negative and the neutral tweets present in the dataset collected.

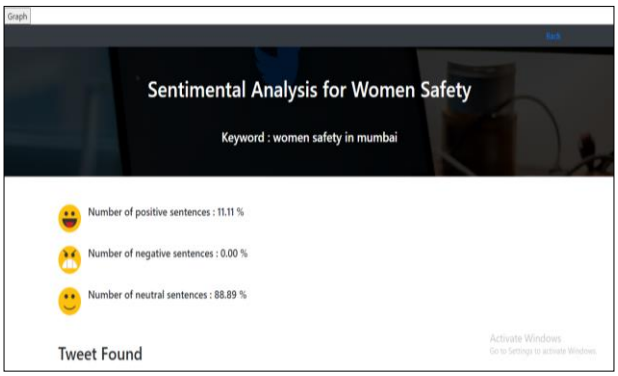
V. RESULTS AND DISCUSSIONS

With this project, we count the percentage of positive, negative, and neutral tweets by using the texblob python library for analyzing the tweets present in the dataset. Which will then be displayed graphically by using the matplotlib python library?

Once our project is executed the UI page that appears is as follows.



In the search bar we have to include the city name whose information is needed. Than after analysing everything in the backend the results would be displayed. The percentage of positive, negative, and neutral tweets for the keyword ‘women safety Mumbai’ will be as follows:



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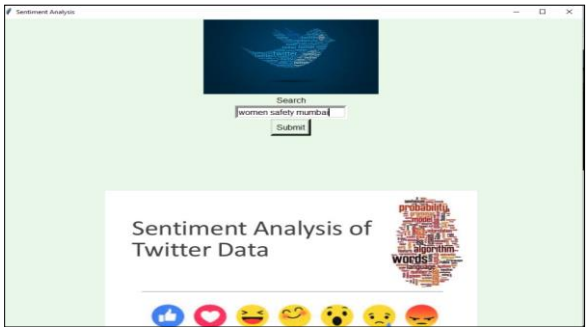
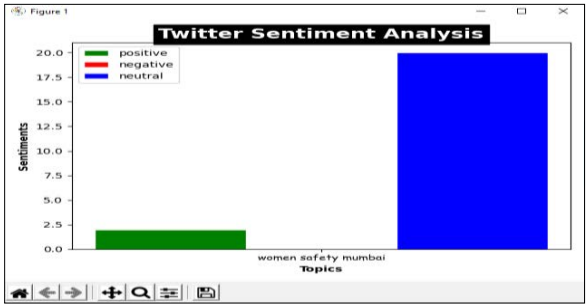


The bar graph indicates the percentage of positive tweets in green, percentage of negative tweets in red, and percentage of neutral tweets in blue.

The bar graph showing the positive, negative, and neutral percentages for Mumbai city is as follows:



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Object detection using virtual input device

Vani K, Aditi Dani

Associate professor, Reva University Bangalore Karnataka

vanikrishna.s@reva.edu.in

Abstract.

Recently the computer inventiveness has crossed to peak level where the people are working in the virtual world. These virtual keyboard and mouse are boon for the physically impairment people. Since there is no usage of wires and external devices people the keyboard functions are used in some different gestures. We use webcam and code is build using the anaconda platform in python language. The defects calculation is done, which is generated and mapped to keyboard and the mouse functions using an algorithm. A Gestures of person who is in front of webcam is understood using image processing.

Keywords—Mouse, Keyboard, Convex Hull Process, Image Processing, Anaconda Platform, Python

I. INTRODUCTION

The use of the internet appliance are the main important part of life. The interaction using internet appliances are most appropriate gradually by which the high number of people take it very easily but it's not so easy these facilities are granted. But people with physical impairments are having much difficult to properly use these devices. Since the people with disabilities have the physical impairments in which they have some significant limits to control it. Then they cant be used due to there problems. So,it may be very effective to assist technologies and to ensure that accessibility of such devices, the code is developed. In this we use the multi model where we use keyboard and mouse to detect track and colour which replaced the traditional use of keyboard and mouse. Use of the camera and no use of any other additional hardware materials inputs from user are captured and the frames are extracted using vision based technique and hand gesture recognition techniques. The main objective is to build the interactive physical and mouse.

The end user give a chance to person to use the computers keyboard and mouse with hand using yellow colour cap on their finger.

The secondary objectives are:

- Recognize the yellow colour tip.

- Observe key in which the cap is positioned or not.
- Route the hand motion and the yellow tip to the gesture of mouse.
- Replicate finger numbers to determine the left click and right click of mouse.

The simple gestures can do the keyboard function in which virtually they may have the physical appearance. If gestures don't match, the box shows green box. Then real gestures are identified red borders are appeared.
Basically, the object is detected using keyboard and mouse using the anaconda platform using python code. This project aims to help for paralyzed people, to use and can easily interact with the system using virtual mouse and keyboard.

The articles come up. Section 2 discuss about our project related works. Section 4 discuss about the methodology and applications as we followed. Section 5 Results and Analysis followed by Section 6 discuss about the conclusions. Future world it is most liked practically and the most featured security have the own revolution where the smart homes are made possibly from Internet Of Things.

II. LITERATURE SURVEY

In this paper[1] the author says about the development of hands gesture using virtual Mouse and development of hands gestures.

In this paper[2] the author says about the the facial expression using deep learning to assess the intelligent system to uncertainty.

In this paper [3] the author says about how to handle the virtual keyboard and mouse for handicap people.

In this paper [4] the author says about the how to control the mouse using web camera in which the person can operate virtually.

In this paper [5] the author says about the keyboard and mouse to gesture it and how to use interacting of two virtual devices.

In this paper [6] the author says about the eye gaze and eye blink for virtual keyboard interaction.

III. PROPOSED SCHEME

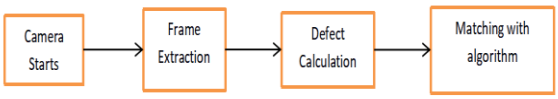

Fig1. Block diagram of Object detection

1.Camera starts: Firstly, here the camera starts the program then it takes next step.

2.Frame Extraction: In Frame Extraction it uses the convex hull process to start its next step.

3.Defect calculation: In defect calculation it takes the matching of defects and by using centroid calculation.

4.Matching with algorithm: If the Convex hull algorithm matches then the output will be detected using gesture of mouse and keyboard

III. METHODOLOGY

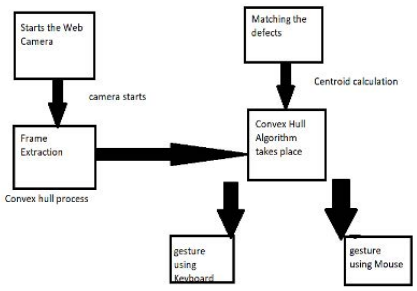

Fig2. Flow diagram of Keyboard and mouse

Mouse uses image processing in that we use RGB to HSV method to build and start the working of it the defects are the real and are observed using the concept of the image processing in that RGB to HSV which the range filter is set to its threshold value for minimum and maximum process to identify its particularly functionality:

When the cam-coder starts its execution process then the below steps are followed:

Step 1: Firstly fix the experiment on the laptop, When the experiment starts it will accordingly starts its video recording and it display some circumstance.

Step 2: It is achieved using open CV builtin library which the performs and captures some scene and colors.

Step 3:There are many methods so in that there is used range filter for in which the human being can adjust his specific objects and colors.

Step 4:To detect the object the range filter method is used where it sets the threshold value that can be RGB to HSV.

Step 5:When the user is using the yellow colored objects it is used using minimum and maximum threshold values in which the object can be detected using the mouse.

Keyboard uses convex hull algorithm to build and start the working of it then the web camera opens and the person can see his window with consists of row of keys in that the open palm is shown then he can move the hand from left to right.

Step 1: The camera opens then the window is appeared.

Step 2:Letters and the row of keys which are really used is visible in color of red.

Step 3. The use of real movement of letters and keyboard it will move functionality of computer.

Step 4. Using the palm the row of keys are passed to right to left with the help of keyboard and its consequence.

Step 5. Using the fingers the key can be more essential for letters and some keyboard methods.

Step 6. The letters are printed on the screen and will be visible in the camera .

IV. RESULTS ANALYSIS

Using the gestures of hand which the video captures the live environment in an video opening through the virtual keyboard which has been traced. A small row of keys has the color red can be very quiet used. Using the picture accordingly with the numbers and letters the rows of key function is captured.

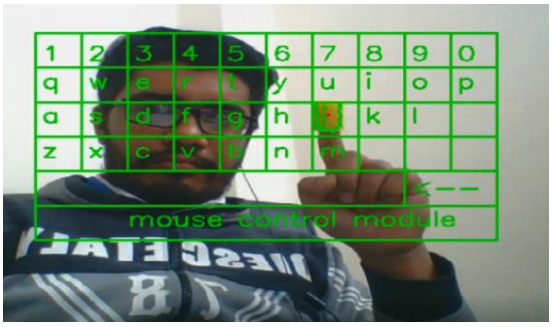

Fig3. Keying in

The user is trying to type the the letters which is used to detect it using the mouse control module.

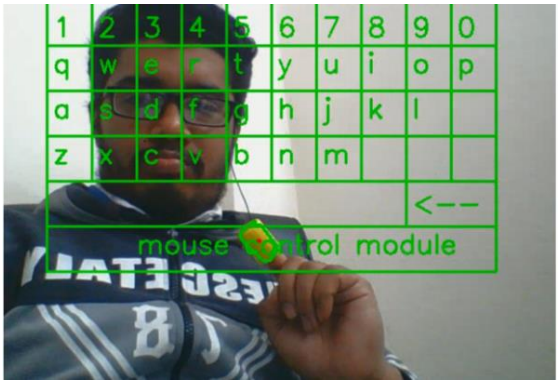

Fig4. Controller

In this figure the user is trying to control mouse in which he can able to understand.

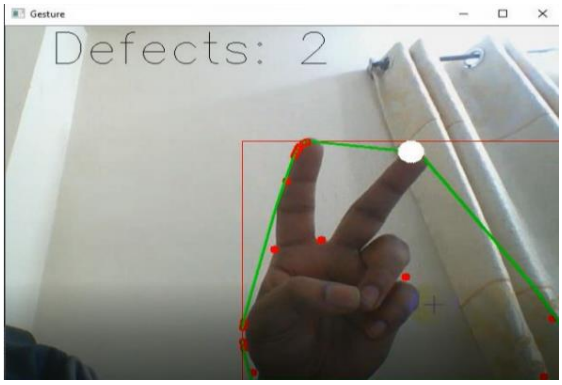

Fig5. movement of pointer

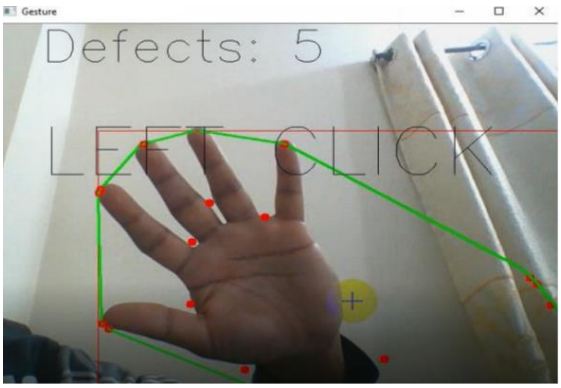

Fig6. Left snap

The user is trying to operate the keyboard using his palm in which he can left click and the defects are shown as 5.

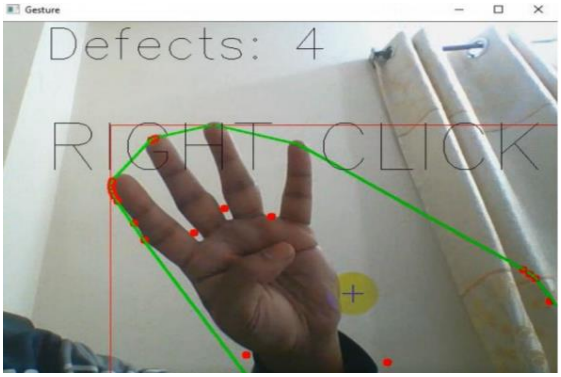

Fig7. Right snap

In this the user is trying to right click on screen to operate the user where he controls it and the defect is shown as 4

V. CONCLUSION

The recently published method is used to recognize the hand and gestures which provides the mouse to detect the threshold value using the RGB method in which the drag and drop is used the skin separation is reused to discrete the images and color with hands and its back end. To separate the arm method who solves the circumstance and to detect the hand movement by this the user can easily use the gestures which will be easy for him and creates one real one tampering and etc. This implemented project is very easy and is used in real time examples like medical science in which the calculation is most important unluckily it may no be built because of absence of human machine interaction.

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FACE EMOTION DETECTION AND RESPONSE SYSTEM USING CNN

Vinay Kumar M[1], Vaddadi Rohith[2], Surendrabalaji[3], Vaibhav Kishore[4],*Rajiv Bhandary*[5]

[1]Assistant Professor, School of Computer Science and Engg, REVA University, Bangalore – 560064

[2,3,4,5,] School of Computer Science and Engg, REVA University, Bangalore – 560064

[1]vinaykumar.m@reva.edu.in

[2,3,4,5,] R18CS449@cit.reva.edu.in, R18CS430@cit.reva.edu.in, R18CS450 6@cit.reva.edu.in, R18CS494 @cit.reva.edu.in

Abstract:

Artificial intelligence's fast development has had a significant impact on the world of technology. Machine learning and deep learning algorithms have had a lot of success in many applications including classification systems, recommendation systems, pattern recognition, and so on, because previous algorithms failed to match human demands in real time. Emotion influences a person's ideas, actions, and feelings. Using the benefits of deep learning, an emotion recognition system can be constructed, and various applications such as feedback analysis, face unlocking, and so on may be executed with high accuracy. This project's main goal is to develop a Deep Convolutional Neural Network (DCNN) model that can classify five different human face expressions. The hand gathered picture dataset is used to train, test, and verify the model.

Introduction:

Computer systems, software, and networks are rapidly developing and being used. These systems play an important role in our daily lives and make life much easier. In today's world, facial expression recognition systems are critical because they can capture human behavior, sentiments, intentions, and so on. Traditional facial expression detection methods are slow and inaccurate, whereas deep learning-based face emotion recognition has proven to be superior. This method intends to create a deep convolutional neural network model that can distinguish five different human facial expressions, which could be useful for customer feedback analysis.

Machine learning is one of the newest computer science technologies that is projected to have a 90% impact in the next four years. An artificial neural network, inspired by the human brain, is used in deep learning, a type of machine learning. Convolutional Neural Networks (CNNs) are a type of deep neural network that uses convolution as a mathematical procedure. Because the collection is made entirely of images, the system uses a 2D CNN to identify them. Not only has the proposed deep convolutional neural network been taught to categorize five different human facial emotions, but it has also been shown to perform effectively.

Literature Survey:

Speech is recognized as the most adaptable and natural means of communication, according to Alif Bin Abdul Qayyum et al. [1], who presented "Convolutional Neural Network (CNN) Based Speech-Emotion Recognition." Speech may reveal a great deal about a person's mental, behavioral, and emotional traits. Additionally, activities related to speech-emotion recognition can aid in cybercrime prevention. Research on speech-emotion recognition utilizing concurrent machine learning algorithms has been at an all-time high for quite some time. Diverse methodologies, including Recurrent Neural Network (RNN), Deep Neural Network (DNN), spectral feature extraction, and others, have been utilized on various datasets. This paper describes a new Convolutional Neural Network-based speech-emotion detection system (CNN).

According to ImaneLasri et al [2, deep learning algorithms have had remarkable success in a variety of disciplines, including computer vision. A CNN model can be trained to evaluate images and recognize facial expressions. In this study, they developed a system that can recognize students' moods based on their facial expressions. The three steps of their technique are face recognition using Haar Cascades, normalization, and emotion recognition using CNN on the FER 2013 database with seven distinct types of expressions. The findings suggest that face emotion detection is possible in education and that it can assist teachers in adapting their presentations based on the moods of their students.

Shuang Liu et al. [3] suggested "Facial Emotion Recognition Based on CNN," stating that Computers will ultimately acquire not just IQ but also EQ as artificial intelligence progresses. Affective computing, or giving computers feelings, has recently sparked a lot of interest. One of them is facial expression recognition, which has become a hotspot in the field of emotional computing research. Face expression recognition is studied using the Valence-Arousal dimensional emotion model in this study. Using a convolution neural network, this study develops a method for predicting the valence dimension of face expressions.

Whitehill et al. presented in [4] a method for detecting involvement in pupils based on their facial expressions. As students interacted with cognitive skills training software, the technique used Gabor characteristics and the SVM algorithm to determine involvement. The authors got their classifications from videos that were annotated by humans.

Ref.No.	**Authors**	**Paper**	**Summary**
[1]	Alif Bin Abdul Qayyum et al	Convolutional Neural Network (CNN) Based Speech-Emotion Recognition	In this paper Speech is regarded as the most versatile and natural mode of communication. Speech may transmit a wealth of information about a person's mental, behavioral, and emotional characteristics. Furthermore, efforts connected to speech-emotion recognition can assist in the prevention of cybercrime.
[2]	Imane Lasri et al	Facial Emotion Recognition of Students using Convolutional Neural Network	In this paper they say that Deep learning approaches have achieved significant success in a variety of domains, including computer vision. Indeed, a convolutional neural networks (CNN) model can be taught to evaluate photos and recognize facial emotion.
[3]	Shuang Liu et al	Facial Emotion Recognition Based on CNN.	In this paper they say that As artificial intelligence advances, computers will eventually acquire not just IQ but also EQ. Affective computing, which gives computers emotions, has gotten a lot of interest recently. Facial expression recognition is one of them, and it has emerged as a research hotspot in the field of emotional computing.
[4]	Whitehill et al	Facial Emotion Recognition of Students using Convolutional Neural Network	In this paper they proposed an approach that recognizes engagement from students' facial expressions. The approach uses Gabor features and SVM algorithm to identify engagement as students interacted with cognitive skills training software.

Modules Identified

This project is classified into two modules

- Python flask server
- Web Application

Python Flask Server: Python flask framework is used as a backend for this project where in the input video stream from the web application is processed on the server and respond with a reaction.

Web Application: The web application built using HTML,CSS and Java Script uses sockets to transfer the video stream from the user to the server.

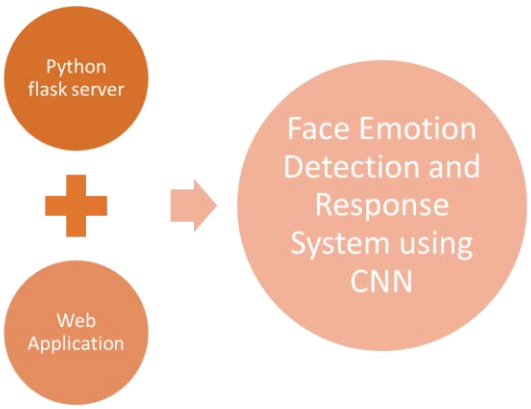

Fig 1 shows the various modules used in the paper

Objectives:

Face Emotion is highly crucial in understanding human psychology. Human emotion detection has several uses, such as identifying the emotion of a student in an online class. Our project focuses on the development of a web application that takes an input stream of video feed from the user's web cam and analyses and attempts to improve their feeling by doing various actions such as playing a good music.

Machine learning techniques have advanced to the point that it is now possible to build a machine learning model that can understand a human's emotions. Because the Python flask APIs established for it may be used for a multitude of other applications, such as classroom proctoring, this project has endless potential.

Results:

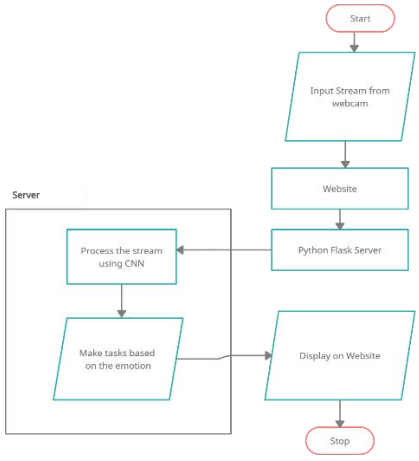

Fig 2. Shows the flow diagram of the model

Using the java script sockets method, the video stream from the web application is transferred from the client to the python flask server. The stream delivered to the server is processed by the Python Flask server using CNN, and a task to be completed is sent to the client in order to provide an appropriate answer. Figure 2 depicts the detailed flow of the procedure.This approach recognizes emotions on all faces in the camera feed. The test accuracy attained 63.2 as shown in the figure 3.

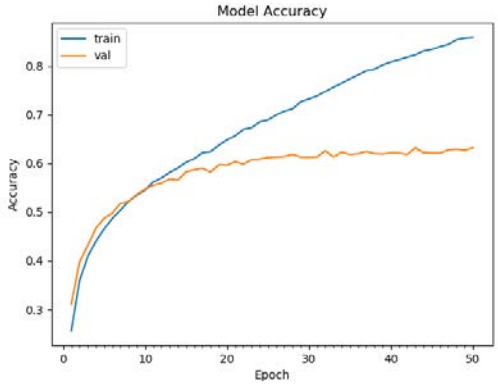

Fig 3. Shows the accuracy of the model.

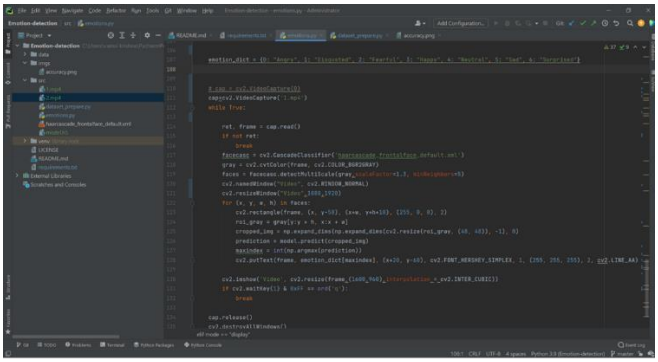

Fig 4. Shows the code for open cv

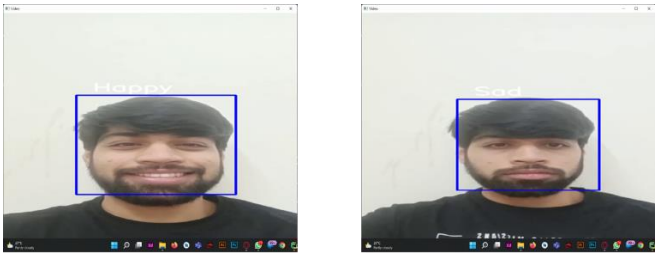

Fig 5. Shows various emotions detected

Conclusion:

We may infer that a human emotion recognition system can be highly valuable, especially during difficult periods like covid, when individuals are not physically connecting with one another.
When working, a user web application with a basic user interface can assist users to relieve tension.
We are excited to work on future advancements to this concept in order to improve the efficacy of the present emotion recognition algorithms.

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Secure Document Vault using Blockchain and IPFS (InterPlanetary File System)

Suhasini N1,Nikhil C B2, Shamshtabrej M Y3, Karthik P R4, Venkatesh S

suhasini.n@reva.edu.in, nikku10227@gmail.com, tabrezy8228@gmail.com, rashinkarkarthik@gmail.com, venkateshstalian@gmail.com

Abstract.

In the past few years the Blockchain technology has gained tremendous amount of trust for its security because of its decentralized in nature. Data such as government or non-government document plays very important role in day-to-day life. The interference in the data change is irrelevant which causes the data to lose and data stolen which led to bigger problems. To overcome it, this project uses encryption methods to secure the data. The data could be any document e.g. Driving license, lease documents etc. The data store on the website cannot be accessed by any other party apart from the user itself. The technologies which are used are blockchain and IPFS. The IPFS(InterPlanetary File System) returns the hash (SHA-256) of the file which is present on the network in which this model is going to save or share the data in distributed manner. Which is Distributed file system. By using the hash code user can access the secure file. After getting the hash code from the IPFS this algorithm, will be going to encrypt the hash and store it into the blockchain which acts as the secure database.

Keywords— encryption, security, cryptography, algorithm, IPFS, blockchain

1. INTRODUCTION

This article will tell us about the project which is based on blockchain and IPFS. Which is helps the user to store the document in the IPFS and then store its hash code in the blockchain. The drawback is that by using the hash anyone can access the file which is not much secure to overcome it the model will further encrypt the hash code then store it in the blockchain. Islet leads to the which type of encryption algorithm should be used and how much time it will be consumed to encrypt and then store is it flexible? All the questions will

be answers below. First of all, the blockchain technology used is the Ethereum based blockchain. Which is the digital money on the private or a public network.

The Blockchain technology, IPFS, and the distributed ledger are now getting massive attention in the IT Industries which triggering several projects in different fields, but the financial industry is one of the most big industry that is considered the main use of the blockchain concept. The interplanetary File System(IPFS) is protocol that provides a peer-to-peer network for storing and fetching the data as in the form of distributed file system. The files and the blocks it contains are given unique fingerprint known as a Cryptographic hash, IPFS will not provide duplicate hash for the same network. A cryptographic hash function is an algorithm that takes an arbitrary amount of input data from an identifier and produces an output of a fixed size of cipher text. It stored the cipher text in the blockchain.

Blockchain technology is a distrusted network that provides high security and stores the information in the form of digital ledger technology, blockchain technology provides secure transfer without an intermediary. Blockchain technology provides a permanent, record of each transaction, Blockchain is fully transparent and shows real-time transactions. Distrusted Ledger Technology (DLT) that stores entries in blocks of the transaction, grouped and hashed into the cryptographic hash algorithm. Each block relates to all the blocks before and after in thought a distinctive hash pointer which increases more security to the blocks, if anything changed in a block then the hash value will also change.

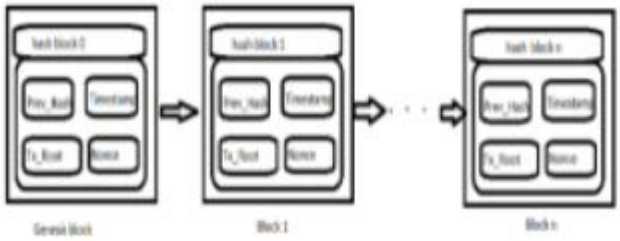

Fig. 1. Blocks in the blockchain.

In Fig. 1 show like how the block is interconnected with each other by using the previous hash which hold the previous block address in the network. Every node consists of timestamp, [9] a nonce, the hash value the nonce is the method is a random number to verify the hash, this will ensure the structural integrity of the block chain up to the first block which is called as “genesis block”. In the hash part which is unique from each other which is lead to less frauds since if the change of a block in the chain can cause the hash value to change. If the majority of nodes in the network agree through a consensus mechanism on the validity of each transaction in the block and on the validity of each block, the block is created and add to the chains. That way once the information add to the block chain cannot be deleted or modified. The best example is Bitcoin, in Bitcoin the block is created by those who got reward because of miners of the Bitcoins, miners are the validators of the block. Now, people all over world can trust each other and transfer different types of assets to each other through the internet.

Our main goal is that the user may able to trust a platform where he can store and manage his private documents in that platform form. The data which is store in the blockchain should not be visible as directly to the end users as encrypted for in encryption RSA algorithm might be the good solution to the problem. So, for In this project the algorithm is to encrypt the data and then store in the blockchain.

Our project name “Secure Document Vault” is the application where the end user can store his private documents which is very secure and unerasable our application is based on blockchain and IPFS once the end user stores his document in our application, he/she will not able to modified or changed. IPFS have the option to edit the uploaded data only to authenticated end users that create a various resiliency network enable continuous availability with or without backbone internet connection. It means a better connection to develop the world this application will help in during natural disasters, or just when some uncertainty some thig happened with the wi-fi or systems. Today’s most of the modern website are inefficient and expensive. The IPFS work on the Peer-to-Peer network which saves big on bandwidth making it possible to efficiently distribute high volumes of data without duplication.

2. LITERATURE REVIEW

The blockchain technology can used in the banking system. To prevent the fraud transfer of the money or assets. In this paper author talk about the [1] The data stores in chronological manner for document in blockchain technology. for that they are using the IPFS for storing the original soft copy of the data documents author says block chain-based structures is less eco-friendly in compare to general data base approach. So, they go with the IPFS to store massive amount of statistical data as in the form of remotely. Since the block chain is every lasting data which cannot be modified. In this each of the block is unique fingerprint known as a cryptographic hash. Which is also used for verification and validation.

According to the author [2] the block chain is the revolutionary that has been under laying for many years because of the issue with scalability the decentralized has been down by the centralized which is run in current system. The distributed storage system which this model, can say the IPFS is used to bypass storage obligations and increase throughput. They talk about dual blockchain by adding the master block reference in the ledger instead of the original blockchain. Their analysis shows that this method can achieve up to 25.8x higher throughput and nearly 1685-time lesser lodger register size than Bitcoin Core.

[3] In this paper author says Blockchain technology is a distributed technology that supports distributed infrastructure and it is a computing pattern. After that coming version, introduced the super account book and later introduced blockchain 3. This paper is a combination of the core of blockchain technology and kernel. "Blockchain Technology + Accounting Services", this technology used in the accounting industry by combing blockchain technology and IoT (Internet of things) based on the amount of data

There are several research papers. But the paper which is write the [4] Jammulspti Ravi Teja where he talks about the maintains of the documents which is important like bonds, government related documents, property documents and many more. And, authority where

the documents In this project, re get altered which is very insecure to overcome this drawback, he provides the solution by implementing the Merkle tree algorithm for data storing.

[5] Blockchain technology has received great attention in overall field in recent years. And has Reached great height in the past 10 years However at some extent, blockchain data volume is continuously increasing due to non-deletable, immutable and non-additional features. This theoretical method is proposed in this paper to increase throughput and reduce the storage. In this paper they focused on the IPFS-based blockchain data storage to solve the problem. By using the characteristics of the IPFS network and the features of the IPFS hash function, blockchain data is significantly reduced. Compression ratio can reach 0.00818. Based on analysis, it also has good performance in security and sync speed of a new node

Since, The IPFS work on peer- to- peer network [6] In this paper author talk about the peer-to-peer version-controlled file system that synthesize learning. based on the IPFS and blockchain they utilize the use of the IPFS and block chain in way that the individual user can access the file in the secure way. They address the high- throughput problem for users. IPFS by introduce the role of the content service providers and the block chain to combined IPFS with the storage model. Based on their analysis this provide scheme can effectively solve the problem of security.

3. METHODOLOGY

For understanding our project first one must know how the blockchain work for the best example is the bitcoin which is now day more popular the bitcoin is based on the blockchain is just like a database for [10] storing the transaction. In general, the blockchain acts as the database which stores the information, unlike most database which in the centralized system but the blockchain is a decentralized system which means that the data does not store in the particular system it stores the data in the network which is called the Ethereum blockchain network. The blockchain is like the block which is connected in the manner of a linked list. Where each block holds the address of the previous block. Because of the decentralized manner, there is no authority that private the user to access the data it is highly secure, and transparency of the transaction which is made our project include the high use of the blockchain.

For our project we used two technology 1. Ethereum Blockchain which is used to store the data about user file as the hash file. 2. IPFS (Inter Planetary File System) it is basically used for the sharing data in a distributed file system.

Secure Document Vault Algorithm

Step 1: - get the data or file from the user and store in the object variable

Step 2: - convert the file into file Buffer

Step 3: - send the file document to the IPFS

Step 4: - then IPFS create a node for the file revert back the hash of the node where the file is store.

Step 5: - check whether the data existed in the block chain if existed print the data is already available.

Step 6: - if not store the hash into the block chain with some additional data like (document name, categories, existence etc)

Step 7: - Display the file from the block chain.

The full elaboration of the algorithm is below

A. get data file from the user

In this project for getting the user data, we have to call the document object function which help to fetch the data file from the user personal system and store it in the object variable. For this model used the react for the user experience where the react will handle the getting file function.

B. Convert the file into file Buffer

In this project, will convert the file into the file buffer which is act as the temporary file object. Without effecting the original file once it saved it will automatically update the file this will allow user to elaborate its documents before updating

C. send the documents to the IPFS

To actual work this first this project, one must send the document to the IPFS node. Where the IPFS will evaluate and the check whether there was duplicate or not and store the file in the node and send back the IPFS hash. The hash is work in the principle of DAGs (directed acyclic graphs) specifically, they use Merkle DAGs this will help uniquely identifier that is a hash of the node's contents. In this project, we are using the 'infra' which is the public IPFS API's for storing the document for more information visit the infra.io this website provides the user to store the documents. And after receiving the hash code from the IPFS In this project, will store the data in the block chain. The main drawback is the by using the hash code any one can access the file which is not efficient so overcome this project, encrypt furthermore for privacy.

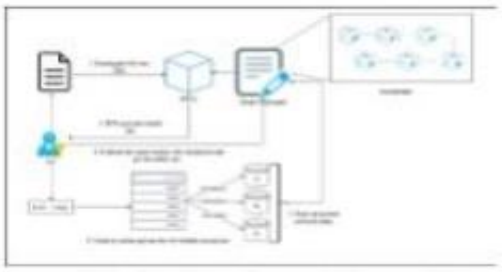

Fig. 2. Working techology of the secure document vault

D. checking for duplicate

Checking for the duplicate is important if the same document object is available at the block chain is will lead to wastage of the block chain as In this project the data redundancy which leads to further complication in the block chain [8]

E. store in the block chain

In this project, after getting the IPFS hash further encrypt the data from the IPFS by using the RSA Encryption algorithm with user details and categories which that document belongs and store into the block chain. After it will ask the gas to pay for transaction to be completed.

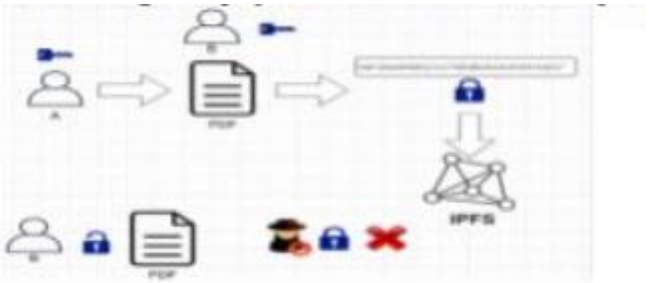

Fig. 3. Key authentication

Let's say the file random.jpg file will store in the block chain first it will send the doc to IPFS then IPFS will going to process it and send the hash code of the file back to program. Where the program will encrypt the hash and add random private key which look like.

"0xF42ba36FdaFe215c574D1f6a18A61d419044A915" +private Key only the user who has the same key can only access. If other than user who has a key try to access it will be going to show the error and it will not show anything. After words it will store back into the block chain with some additional information like user id categories from which it is belongs and some more information like (document name, categories, existence etc).

4. RESULT

In this project the result got is from the prototype which the data is created in project, will be further modifying it the below screen capture will provide the demo of our project. In this project we see that sending the file to IPFS in fig.5 will created the buffer of the file which is been uploaded and in the same figure how much Gas we have to pay for the updating in the block chain. In figure 6 In this project, successfully get the file and displaying on the screen.

Fig. 4. Screen shoot (1) before updating

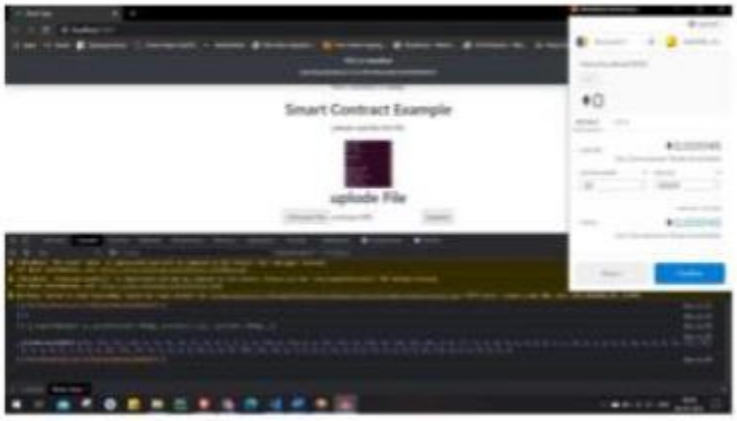

Fig. 6. Screen shoot (2) updating document.

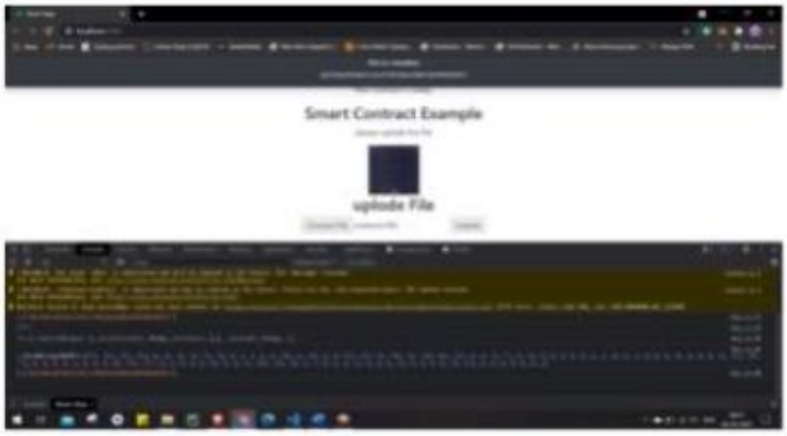

Fig. 7. Screen shoot (3) after adding document

The project can be further moficable by providing the addition features as user interface. Ex

Fig. 8. Modification interface

5. CONCLUSION

Since nowadays these type of project come to know that security is very important for every individual. Now the world governs by the data which has all the information about the user like what he wants, what will be his preferences . So, the hacker might try to steal the information from the user and used it to harm them, the technology like blockchain and IPFS is very secure and reliable the user needs to get to know about this technology. Our main goal is that the user may able to trust a platform where one can store and manage his private documents in that platform form. The data which is store in the blockchain should not be visible as this project, as encrypted for in encryption RSA algorithm might be the good solution to the problem. And the node which is created by the IPFS to store the file. The user might not know where exactly the node is created so if the file got to change the hash code

also change accordingly so the IPFS creates the copy of the node in the several systems. The blockchain will provide high security where each block is connected like a linked list. So, this will make the highly secure system.

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CNN based Brain Tumor Diagnosis using MRI images

Yeshwanth N
yeshwanth.narendra@gmail.com
School of CSE, Reva University
Bangalore, India

Thulasi Prasad V
thulasiprasad1999@gmail.com
School of CSE, Reva University
Bangalore, India

Sai Varun V
saivarun1822@gmail.com
School of CSE, Reva University
Bangalore, India

Jayadeva Reddy
yedulajayadeva@gmail.com
School of CSE, Reva University
Bangalore, India

Thirumagal E
Thirumagal.e@reva.edu.in
Assistant Professor, Reva University
Bangalore, India

ABSTRACT: In the recent times, there has been a sudden increase in the number of cancer patients due to genetics or mutations. Although the cases of brain tumor are less in number, they are hazardous. And the detection of brain tumor is time taking process, more human errors might occur and sometimes it might be late for the cure. The objective of this project is to create a real time application to predict the brain tumor via taking the MRI scan reports and find the position of the tumor. Using CNN, VGG-16 models and other deep learning concepts we predict the tumor in given MRI scan and help the doctors in finding it early and reduce time complexity.

Index Terms: Brain tumor, CNN, VGG-16, DL, MRI Scan.

I. INTRODUCTION

In recent years Image processing has been widely used, and it has also played a role in the medical profession. Mind tumors are caused by an abnormal enlargement of cells in the brain. Intracranial neoplasm was another term for a brain tumor. Malignant and benign tumors were the two types of tumors. Standard MRI ordering were formerly utilized to distinguish between various types of brain tumors based on visual grade and soft tissue touch and feel. The World Health Organization's report on the level malignancy divided more than 120 types of brain tumors into four categories [2]. The overripe region of the brain causes various symptoms in all types of brain tumors. Headaches, seizures, vision problems, vomiting, mental speculation, memory lapses, and a loss of balance are among of the most common symptoms [3]. Brain tumors were caused by division, ionizing radiation from cell phones, and a very low prevalence rate. Magnetic fields, chemicals, head trauma and damage, and resistive variables such as illness, allergies, poisoning, and so on [5] are all introduced. As a result of the ideas, tumors will form, which will begin to expand and compete with the brain. Vinyl chloride, neurofibromatosis, ionizing radiations, and other factors posed a threat to brain tumors. Machine-based data analysis techniques will teach a private computer how to act like a human and how to do so in their own unique way. A non-public computer model will be utilized in deep learning to distinguish certain tasks from images, voice, text, or video. Shows whose human degrees have been surpassed by deep learning algorithms. An artificial neural network, which had created a set of acts as neurons, was the most recent method of the most famous neural networks. Each neuron operates as a fork, and each fork is linked to another by connections. [6]. The purpose of this paper is to create a model that uses a complicated neural network to aid in cancer detection from MRI scans. To determine the correctness of the complexity method, the proposed method is evaluated and compared to current distinct methodologies.

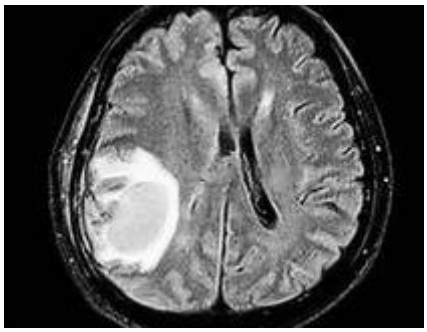

Figure1: Scanned MRI pic

II. RELATED WORKS

Image separation & differentiation will be one of the most important tasks in machine learning, and it has also been widely used in medical purposes. CWT, DWT, and SVM are all suggested by MG, ML, DL et al [7]. The technique of finding and distinguishing cancers using deep learning models is described by SS, and DR et al [8]. 3-D based CNN, ANN and SVM were employed for deeper separation. DS, and RD et al [9] address the separation of pathological matter(Tumor), normal matter, and fluid (Cerebrospinal Fluid (CSF)) by removing the same side from each separated matter and disparate tumor pictures with NN.

According to G. Hemanth, M. Janardhan, and L. Sujihelen et al. [10], initial tumor diagnosis was made sensible using the same data mining curving technique. It is a repurposed CNN-based electronic analysis approach. Reema The examination of MRI tumor position could be connected, according to M A. and Dr. B A P. et al. [11]. Radiological examinations could be used to determine the size and location of tumors. For the time being, the evaluation has been finished and delivered. An isotropic spreading filter was used for pre-processing. Support vector machines were used to perform this parathion and difference. This suggested method for brain tumor separation included super pixel separation, feature extraction, and segmentation model development.

III. METHOD PROPOSED

The compiled system's system design was clearly visible. Image collection, pre-processing, separation, feature collection, and separation became the elements.

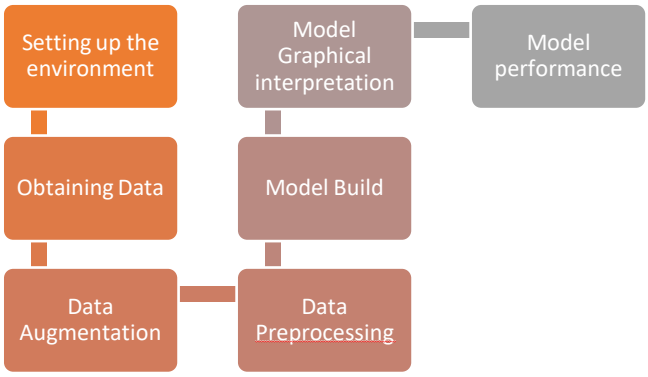

Figure 2: Methodology

Image Collection

For the investigation of brain tumor detection, many bio-scientific picture facts were used. CT and MRI have shown to be most effective approaches. High-priced MRIs, on the other hand, have been operating under the assumption that each magnetic barrier and radio wave may build a pictorial graph of the inside of the human body by identifying the water molecules there.

Very small MRI equipment was used to avoid the complexity of traditional scanning techniques. MRI has a good object and can store a lot of data. NC's MRI dataset from Google was employed in this study [13]. Ours will include 1500 images of normal brains and 1500 photographs of abnormal brains. 'Yes' means tumor photos, while 'No' denotes healthy images in that collection. We split the dataset into three parts 70% for training, 15% for testing, and rest 15% for validation.

Preprocessing

"The use of the preprocessing stage was to get the brain pictures ready for future processing [12]". Suppose the raw data was in 3D, grayscale or 2D conversions were required. To overcome the noise, median filtering became good and the same for biomedical images. Pictures in one-of-a-kind artefacts are included in the data set. As part of the growth process, each image was rotated and resized to a common format. Image quality is improved via histogram razing. The photos would undoubtedly benefit from the contrast limited supply histogram razing technique"[20]. We used the dataset which was in grayscale and used data generator to prepare the data, using 0.2 zoom-range, 0.2 shear-range, and rescale of 1/255.

Image segmentation

A certain area of the image being separated from the backdrop this step was for very quality extraction. The easy stages to separate upset were thresholding and morphological force. However, in the case of brain tumor imaging, the separation technique at that level would not reveal the tumor area's features. Following the tumor size, the total number of photographs taken was also identical. As a result, the separation method might be utilized to separate the brain from the rest of the body.

In healthy photos, this approach may not produce satisfactory results. This aspect of the photograph might be utilized to see the object in the tumor region, which would aid in calculating the area.

The process of computing and assessing authentic features to define a diagnosis observation or symptom is known as feature extraction. The most significant influence on the scale is the feature selection. Asymmetry, diameter, and border asymmetry were all common traits [15].

Classification

Classification In disorder identity from mental images, many systems mastering detains have been carried out. If the article were drawn

out in order, artificial neural networks could be used to distinguish [17]. An ANN classifier considers a single feature that is unrelated to any other article.

To classify tumor photos without dividing, deep learning algorithms would be accurate. To generate a DNN, CNN can be used.

Figure 3 depicts convolutional neural networks. In device learning, the presentation is impulsively given out from the entire picture. This procedure is carried out using convolution in the CNN design. The number of article maps grows in sync with the CONV layer. To stimulate training, a reduction in dimension became necessary. The pooling layer down samples the article capacity. Each label's score is manipulated by fully attaching layers. The model is ready with article and class core thanks to soft axe layers.

For training the brain tumor photos, the CNN architecture was slightly altered in dimension. Table 1 shows the changing model design.

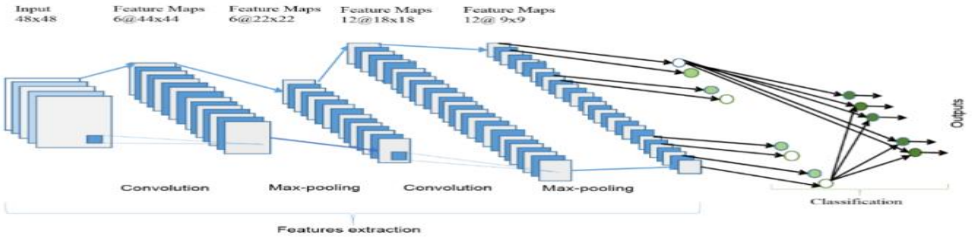

Figure 3: Architecture of CNN [24]

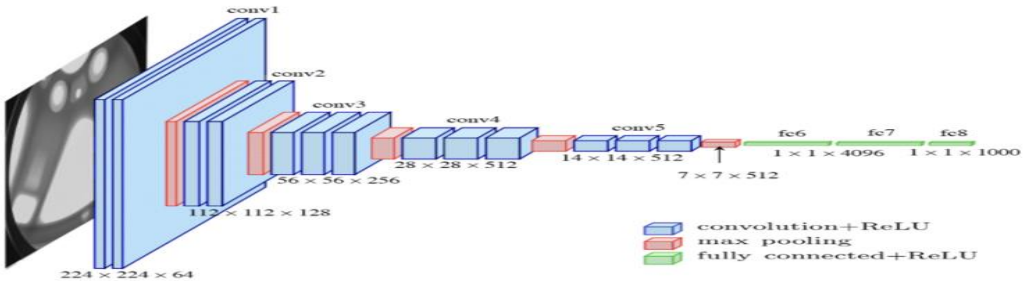

Figure 4: VGG-16 Architecture [23]

VGG-16 model is simple architecture with 3x3 convs, stride=1, padding=”same”,2x2 max pooling. It is with 16 layers which results in having the highest efficient model the difference between VGG-19 and VGG-16 is that there are 3 more additional layers included in VGG-19 model as the name suggests. The main disadvantage of this model is that it takes a lot of time to run as there will be a large number of parameters and specifically a GPU is needed to run this model.

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 222, 222, 16)      448

 conv2d_1 (Conv2D)           (None, 220, 220, 36)      5220

 max_pooling2d (MaxPooling2D  (None, 110, 110, 36)     0
 )

 conv2d_2 (Conv2D)           (None, 108, 108, 64)      20800

 max_pooling2d_1 (MaxPooling  (None, 54, 54, 64)       0
 2D)

 conv2d_3 (Conv2D)           (None, 52, 52, 128)       73856

 max_pooling2d_2 (MaxPooling  (None, 26, 26, 128)      0
 2D)

 dropout (Dropout)           (None, 26, 26, 128)       0

 flatten (Flatten)           (None, 86528)             0

 dense (Dense)               (None, 64)                5537856

 dropout_1 (Dropout)         (None, 64)                0

 dense_1 (Dense)             (None, 1)                 65

=================================================================
Total params: 5,638,245
Trainable params: 5,638,245
Non-trainable params: 0
_________________________________________________________________
```

Table 1: Model Summary

The model is compiled with “adam” optimizer in ‘keras’ and loss in ‘binary_crossentropy’. We added 4 layers with increase in filters for each next layer i.e. 16 filters for 1st layer and 36 for 2nd , 64 for 3rd and 128 for last layer and the activation used was ‘relu’ the model is sequential.

The dropout rate is 0.25% then the dense layer units are 64 with ‘relu’ activation and then the final dense layer units were 1 unit with sigmoid activation.

We create an early stopping and model check point to save the best accuracy from “kreas.callbacks”. Then we plot the graph accuracy vs loss.

IV. RESULTS AND DISCUSSIONS

The results of this model are very accurate and the loss percentage is also less. This model ran in 30 epochs which resulted in accuracy although the time complexity was a little more than expected the better results were achieved.

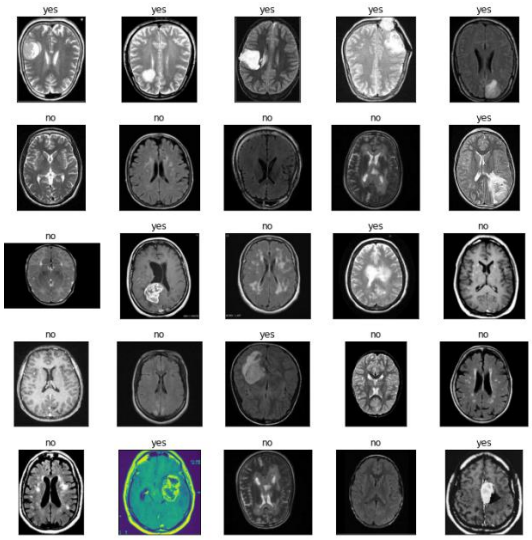

Figure 5: Results from the trained model

This model is built using CNN with first being feature extraction and then classifier model with 5638245 training parameters. This model gives 97.8% accuracy. This method is simple yet efficient, we were successful in predicting the tumor and positioning it.

T. E and K. S [19] has got an accuracy of 97.67% using FCSE-GAN method where as our model we used VGG16 model.

Algorithm	**Overall Accuracy**
Nandpuru [16]	96.77%
T.E and K.S [20]	97.67%
Ibrahim [18]	96.33%
Rajini [19]	90%
Proposed Method	97.8%

Table 2: Performance Analysis

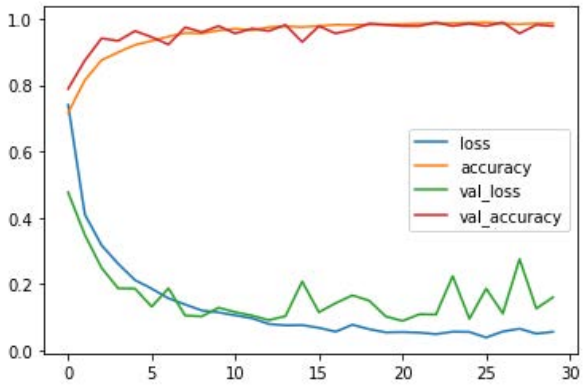

Figure 6: Prediction score in divided data

This is a graph plotted between loss, accuracy, val-loss, and val-accuracy. The X-axis is Epoch and Y-axis is loss value.

As we can see the loss is gradually decreasing as the number of epochs run. The same goes with the validation loss whereas, the accuracy and validation accuracy increases and they are equal at a point of epoch.

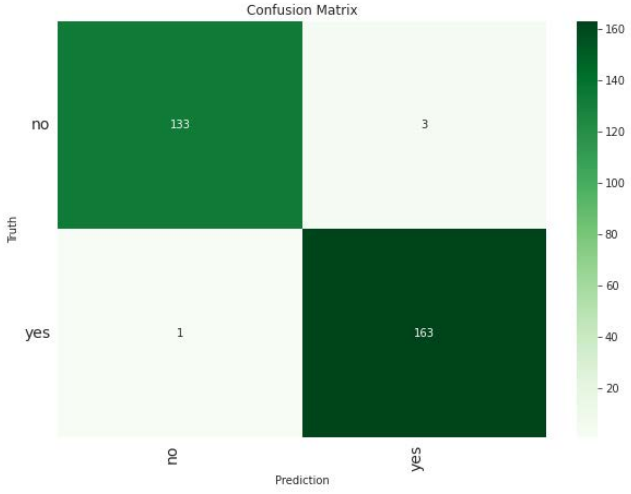

Figure 7: Confusion Matrix

The split data which were used for training, validation, and testing are the data which we use. Number of true negatives are 133 and number of true positives are 163. Here, true negative is “No” dataset i.e., healthy brain and true positive is “Yes” dataset i.e., tumor brain. As we can see the prediction made has the most efficient outcomes so, this model has the highest chances of classifying the MRI scans.

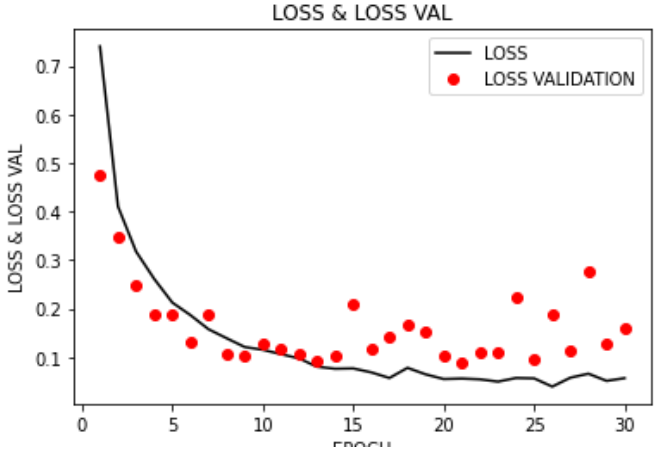

Figure 8: Loss and Loss Val plot

As we can see the loss percentage has been decreasing gradually with the increase in the epoch.

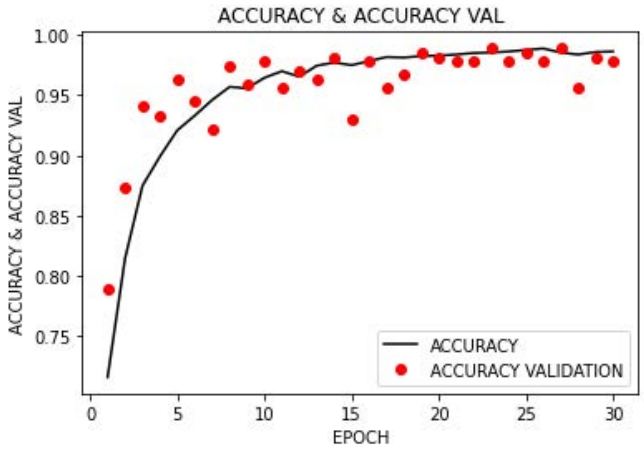

Figure 9: Accuracy and Accuracy Val plot

The accuracy has been increasing with the increase in epoch this resulted in highly efficient model.

V. CONCLUSION AND FUTURE SCOPE

Although the brain tumor is a time taking process to analyze via MRI scans our model helps the doctor to verify whether the tumor is present in the MRI scan and position it faster. And reduce the human efforts and errors while classifying the MRI images.

Our project (model) helps the doctors in finding the tumor. Our main aim was to help the doctors who has no proper infrastructure in the hospitals sometimes even the knowledge about the tumors is unknown to some doctors but when help is needed or to gain knowledge about the tumor users can easily access the data from our project and they can check the MRI scan reports to re-check/confirm about the tumor so that the treatment can be given in time.

Our future scope of this project is to also suggest the doctors an alternative treatment for the user i.e., less cost-effective treatment and highest success rate surgery.

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ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION OF TWO 64BIT NUMBERS IN VHDL

[1]Chandana C S, [2]Chaitra G, [3]Churanta Mondal, [4]Sanju V

Authors affiliation, Department of Computer Science and Engineering, REVA University

Abstract.

In today's world most of the processors and systems runs on a 32-bit processor. At some extent it gives us the error less, fast, and accurate value of inputs, but it has some drawback i.e., it can take the input up to 32-bits only and gives the solution till that extent. So, we propose a solution for a 64-bit processor which can add, subtract, multiply and divide two 64-bit numbers in VHDL code. Our motive is to make the system faster than usual which would provide the fastest, less time complexity and the accurate solution for an input.

Keywords. 32-bit processor, 64-bit processor, VHDL code, resistors, LDRD, STRD, ADC, UMULL.

1. INTRODUCTION

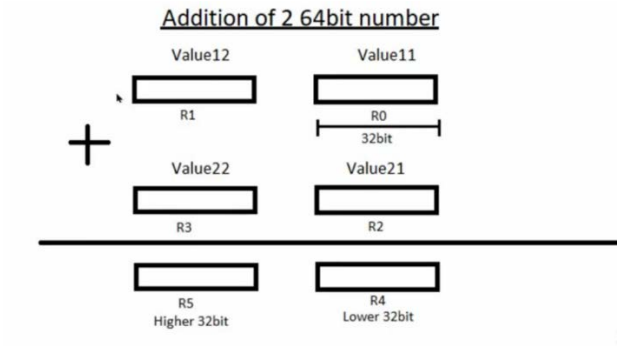
We all know that the capability of 32-bit processor is lesser than 64-bit processor, so data handling is lesser in 32-bit compared to 64-bit processor. A 32-bit processor doesn't have much capability of computing the computational value as compared to 64-bit processor. Also 64-bit processor has more memory address compared to 32-bit processor. With the help of our code, we can perform any basic calculation like addition, subtraction, multiplication, and division using two 64-bit numbers. This helps in increasing the processing power and decrease the time complexity also it provides more space. Our code gives an errorless solution and provides the fastest solution of basic mathematical calculation. We aim to make the processor run faster than others and provide the best solution.

2. ADDITION OF TWO 64-BIT NUMBERS

We all know the addition of two 32-bit numbers and 32-bit is the maximum bit for a register so now we will see the addition of two 64-bit number that is double the range of register.

Basically, the logic part is that you should remember that any operation that should be made on the data or the values must be done using registers that is we can only perform operation when the values are in register.

2

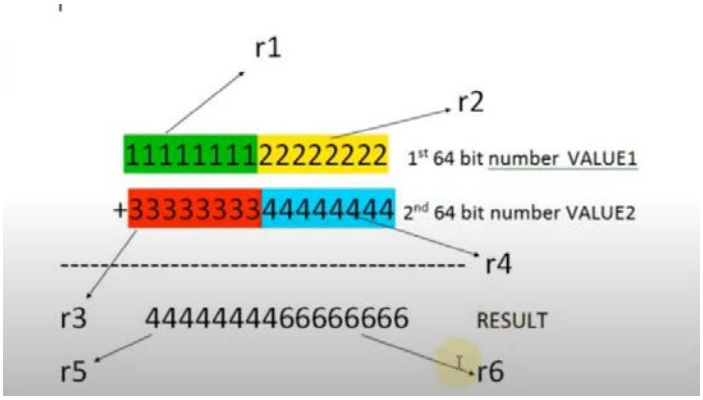


So R1+R0 is the whole one 64-bit number and R3+R2 is another whole 64-bit number, when we perform addition of these you get another 64-bit number.

The number is divided into two 32-bit numbers, higher 32 bit and lower 32 bit and then we will perform normal addition. Lower 32-bit is added and stored in R4, and higher 32-bit is added and stored in R5.

This is done because you cannot add a directly 64-bit number because the maximum value of register is 32 bit and for addition you must use register itself, so we divide the number into 2 parts and add them.

This value 11, value12, value 22 and value 21 are the memory locations the lower and higher 32 bit of first number are stored in value 12 and value 11, the second number are stored in value21 and value21. We will take the numbers from the memory location into the register and then we will perform addition and we will get the result in R5 and R4.



Now the first part will be stored in register R1 the second part will be stored in registerR2. similarly with the second number, the first part will be stored in R3, and the second part will be stored in R4.

The logic is that the content of R2 and R4 will be stored in R6 and the content of R1 and R3 will be stored in R5.

VHDL CODE FOR ADDITION OF TWO 64-BIT NUMBERS

```
AREA add,CODE,READONLY
        ENTRY
START
        LDR R0,=VALUE1
        LDR R1,[R0]
        LDR R2,[R0,#4]
        LDR R0,=VALUE2
        LDR R3,[R0]
        LDR R4,[R0,#4]
        ADDS R6,R2,R4
        ADC R5,R1,R3
        LDR R0=RESULT
        STR R5,[R0]
        STR R6,[R0,#4]
        B LOOP
LOOP
        VALUE1 DCD &11111111,&22222222
        VALUE2 DCD &33333333,&44444444
        AREA answer,DATA,READWRITE
        RESULT DCD 0*0000
        END
```

3. SUBTRACTION OF TWO 64-BIT NUMBERS

The basic operations are performed while subtraction of two 64-bit numbers is loading, storing, and subtracting the values.

At first, we should load the value in register R1 and load the resister value R1 in R2.

Then we should take two numbers using load registers [R1, #4] and the value will be stored in register R3, as well as the load registers value [R1, #8] will be stored at register R4.

This is a simple code which makes no error and performs task faster.

VHDL CODE FOR ADDITION OF TWO 64-BIT NUMBERS

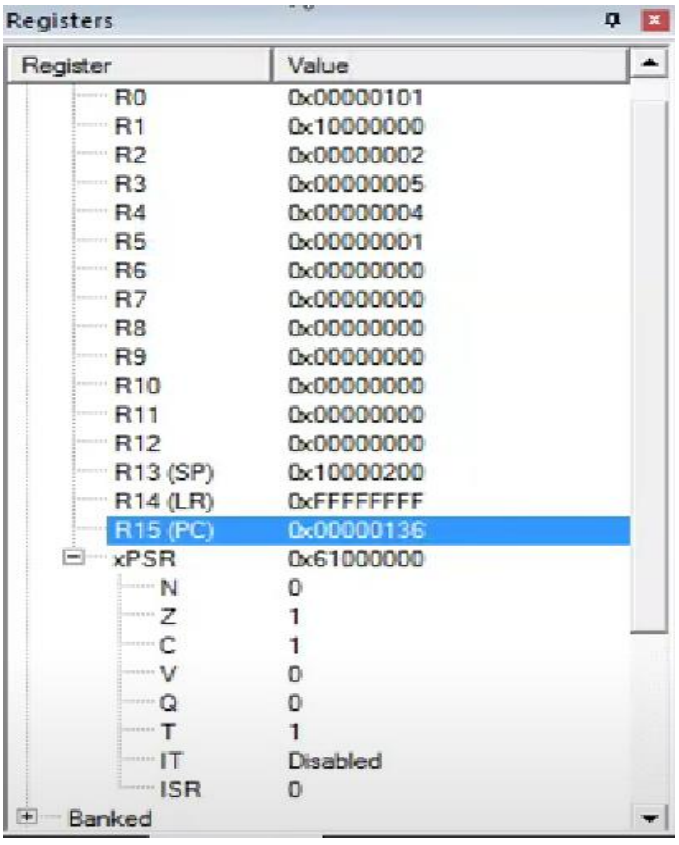
```
AREA BASIC, CODE, RANDONLY
ENTRY
```

4

```
        EXPORT          MAIN
MAIN
        LDR R1=0X10000000
        LDR R2, [R1]              ; COND
        LDR R3, [R1, #4]                  ;1ST NUM
        LDR R4, [R1, #8]                  ;2ND NUM

        SUB R5, R3, R4
        STRD R5, [R1, #0XC]

        NOP
        END
```



4. MULTIPLICATION OF TWO 64-BIT NUMBERS

Compared to addition and subtraction multiplication is a step forward to basic mathematical calculation. In this type of calculation, we usually use 64-bit numbers, we use some different instructions as compared to 32-bit numbers. The VHDL code consists of both addition and multiplication as we use binary multiplication method.

In this code we use LDRD (Load double word (64-bit) from memory to register), STRD (Store double word (64-bit) from memory to the register), UMULL (Unsigned long multiply with 64-bit result). Here at first, we take a 64-bit number and load it to R1 and R3. Then we perform unsigned long multiplication to get the values which next will be added and stored.

VHDL CODE FOR MULTIPLICATION OF TWO 64-BIT NUMBERS

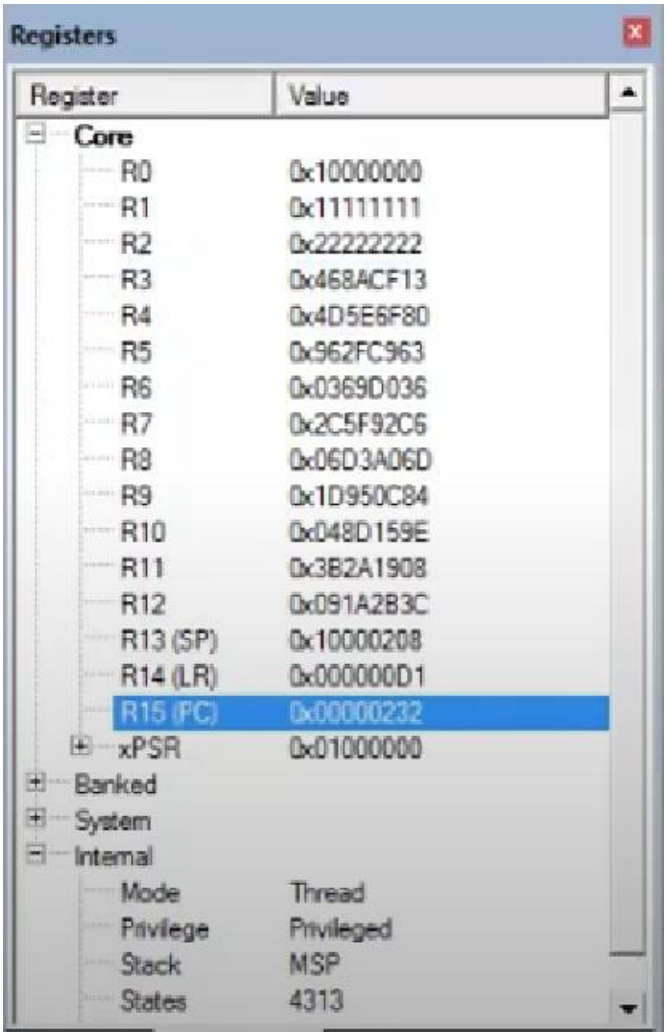
```
        AREA program, CODE, READONLY
        ENTRY
        EXPORT      main
main

        LDR R0, =0X10000000
        LDRD R1, R2, [R0]
        LDRD R3, R4, [R0, #8]

        UMULL R5, R6, R3, R1
        UMULL R7, R8, R3, R2
        UMULL R9, R10, R4, R1
        UMULL R11, R12, R4, R2

        ADDS R4, R6, R7
        ADC R4, R9
        STRD R5, R4, [R0, #16]
        ADC R3, R8, R10
        ADC R3, R8, R10
        ADC R3, R11
        ADC R12, #0
```

```
STRD R3, R12, [R0, #24]
NOP
END
```



5. DIVISION OF TWO 64-BIT NUMBERS

As compared to subtraction we are using basic division, operations are performed by dividing two 64-bit numbers by loading, storing, and dividing the values.

At first, we should load the value in register R1 and load the resister value R1 in R2.

Then we should take two numbers using load registers [R1, #4] and the value will be stored in register R3, as well as the load registers value [R1, #8] will be stored at register R4.

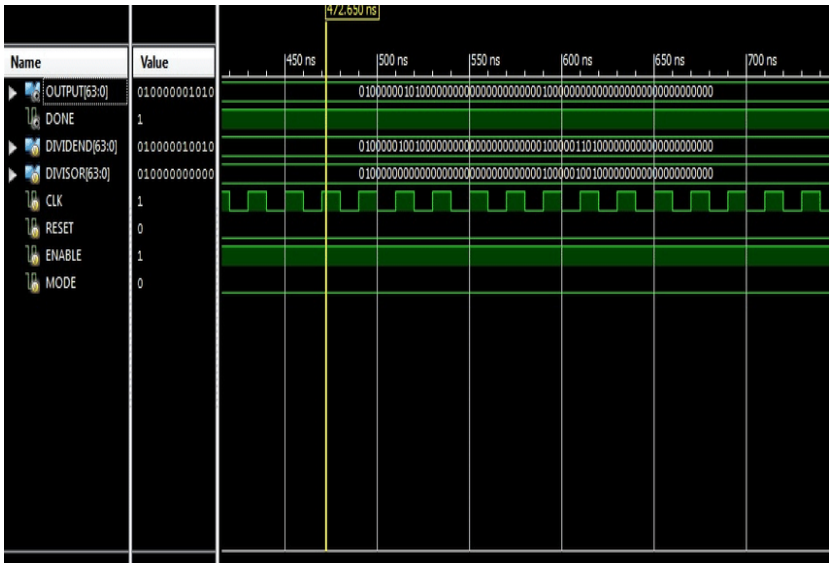
This is a simple code which makes no error and performs task faster.

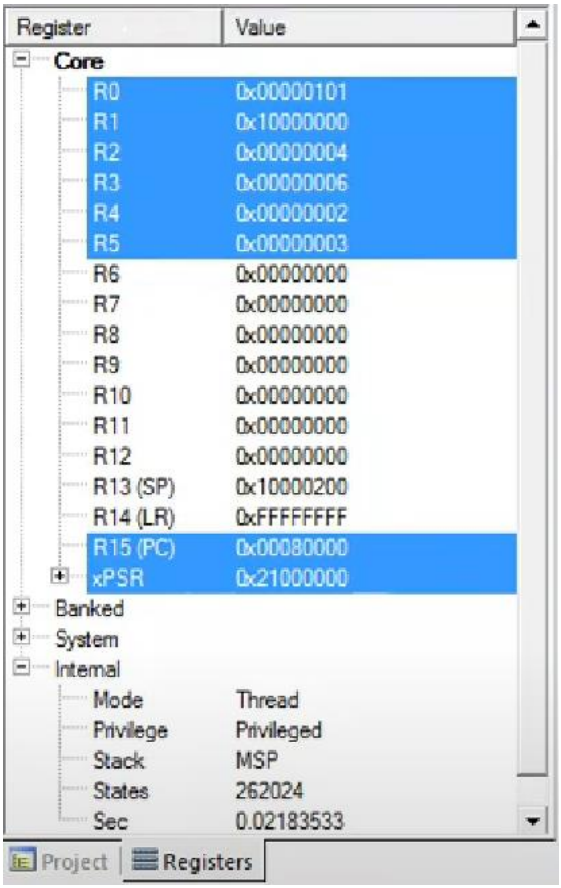
VHDL CODE FOR DIVISION OF TWO 64-BIT NUMBERS

```
AREA BASIC ,CODE,RANDONLY
        ENTRY
        EXPORT          MAIN
MAIN
        LDR R1=0X10000000
        LDR  R2,[R1]                ;COND
        LDR  R3,[R1,#4] ;           1ST NUM
        LDR  R4,[R1,#8] ;           2ND NUM

        UDIV  R5,R3,R4
        STRD R5,[R1,#0XC]

        NOP
        END
```





6. CONCLUSION

In this paper we have shown the basic addition, subtraction, multiplication, and division of 64-bit numbers using VHDL code. Our code returns very less numbers of cycles and provides faster solution, which decreases the time complexity. We have used LDRD, STRD, ADC, UMULL because it takes 64-bit numbers while performing mathematical tasks. We have shown the VHDL code with the output above and our motive is to make the system faster than usual.

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Comprehensive Survey for Crop Yield Prediction Using Machine Learning

[1]Dr. Laxmi B Rananavare , [2]SpandanaM, [3]Dr. Sanjay Chitnis

[1,2]Dept. Of CSE, REVA University Bengaluru, India, [3]Dept. of CSE, R V University Bengaluru, India

[1]laxmib.rananavare@reva.edu.in, [2]spanduspandy5@gmail.com,
[3]sanjay.chitnis@reva.edu.in

Abstract.

A comparison examination of several agricultural production prediction models is proposed in this work. In the agricultural industry, a lot of study is done to estimate the production of different crops. For many years, the research has been conducted for agricultural areas all over the world. Different parameters such as rainfall, temperature, soil type and pH are taken into consideration. Most of crop dataset driven by the government websites consist fields such as crop name, state name, season, production and so on. Recent research has shown that remote sensing is an effective way for estimating yields, and that machine learning, particularly deep learning, can predict a decent forecast by combining multisource datasets including such temperature data, Satellite data, soil data, and etc. Addition of remote sensing imagery has a direct impact on accuracy of the models. For many models, both ground truth data and MODIS NDVI pictures are obtained from several sources. To compare and evaluate the performance of such models, R2 score which also known as the coefficient of determination and root-mean-square error (RMSE) were utilised. The impact of machine learning algorithms in evaluating yield is revealed in this study. This study discusses several yield predictions models in order to analyse previous work and come up with a fresh approach for properly predicting yield.

Keywords.
YieldPrediction;MachineLearning;deepneuralnetworks;regression;SVM;XGBregression;Linearregression;DecisionTree regression;

1. INTRODUCTION

Agriculture is the most important sector in India's economy. Predicting crop yields has become a critical challenge in agricultural field. Farmers everywhere is eager to know how much harvest they will receive. Prediction was made by the farmers based on their past experience cultivation expertise. However, the Yield is depended and influenced by a number of factors. characteristics like dirt (soil type, nutrients in the soil, and ph) meteorological conditions (rainfall, temperature, etc.) and soil level due to these unpredictably changing conditions throughout the year and Crop yield forecast is a difficult task in every season. Farmers face a challenge based solely on their previous experience knowledge.

Machine learning is the most suitable domain forforecasting real-time problems like weather forecasting, infection forecasting, and so on. It is divided into three categories: unsupervised learning, reinforcement learningandsupervised learning,each type has its own set of algorithms, each with its own set of goals. In the agricultural area, machine learning is used for yieldprediction of particular crops. It examines past years' agricultural data in order to extract useful information, employing algorithms from its various categories, a model is trained that predicts future yield. Random forest, support vector machine,KNN, decision tree classifiers, naive bayes classifier, and other techniques are commonly employed. Both regression and classification tasks are handled by machine learning. A regression problem is yield prediction based on agricultural data.Crop yield prediction is required not only to determine the crop's future production, but also which are important to do timely import and export decisions, as well as agricultural risk management decisions, in order to assure food security globally and avoid the waste of money and resources spent in cultivation. The purpose of this paper is to review existing crop yield prediction research in order to determine which factors have the most impact on yield outcomes and which algorithms provide higher yield estimation accuracy.

2. RELATED WORK

[1] India was selected as the study region due to its climatic variation. To perform the study major crops of India such as jowar, rice, tobacco, bajra and wheat were selected and the dataset for the same were collected originally from www.mospi.gov.in and https://data.gov.in.Features such as rainfall, crop names, area under irrigation, are, production and seasons were present in the dataset. Machine learning techniques such as Ridge regression, Linear regression, Lasso regression and Decision tree were applied and Decision tree gave more accurate results.

[2] In addition to Lasso regression this paper used other two techniques of regression such as E-Net and kernel regression. To enhance the performance of the algorithms Stacking Regression concept was induced. Among all the algorithms kernel ridge performed well and after applying stacked regression performance of the model was even more enhanced.

[3] This research explained the step-by-step process for building a Crop yield prediction model. Explained the importance of each and every process starting from data collection, feature selection till evaluation of different machine learning techniques such as DNN, KNN, ANN, CNN. Considering parameters such as rainfall, temperatureand acer was the main goal of the research.

[4] Embedded Machine learning Model was created for prediction of the crop yield. Soil management was the main focus and reducing the usage of fertilizers was the main goal. The system was able to predict that which crop is best suited to grow under the current soil conditions, so that the farmers will be benefited by the best yield. Real time Data from different sources were collected, combining IOT with ML contributed in collecting the real time data.

[5] Nine Indian crops such as Jowar, Soyabean, Bajra, Sugarcane, Cotton, Corn, Wheat, Rice, Groundnut were used to build the prediction model. Separate dataset was formed by combing the dataset from different sources such as Kaggle and West Bengal government website. Deep Learning such as ANN was used to develop a crop estimation system. Including parameters of soil and rainfall data. Prediction was determined using a web-based system.

[6] Self obtained dataset was used to develop a crop yield prediction model. Different machine learning algorithms such as KNN, Decision tree and Naïve bayes was used to determine the relationship between various Physical factors and crops. The study says that physical factors such asSoil type, soil pH, temperature contribute a lot to the yield prediction. Prediction for crops such as tomato, chilli and potato were done in different types of soil such as red soil, black soil and alluvial soil and Decision tree and KNN performed well compared to naïve bayes.

[7] U.S was selected as study region, dataset used was having both seasonal yield and whether data of wheat. Bi-LSTM was built with CNN feature extraction sub-network which predicted the yield with more accuracy and less overfitting. Further theBi-LSTM model was compared with RF, KNN, Polynomial regression, SVR and Naïve Bi-LSTM. As the results all other models except for Bi-LSTM out performed. Performance Evaluation was based on R2 score and MSE.

[8] This research states that applying the prediction analysis before harvesting the crop would help the farmer with enhancement of production. Different machine learning algorithms such as Bayes Net, SVR, Kernel Ridge RBF, GPR, lasso regression and RNN were applied. Crops such as Rice, Alfalfa, Tomato and Maize were selected to build the model. Results showed that RNN worked well when compared by error rate and Bayes Net worked well when compared by accuracy rate.

[9] Maharashtra was the study are selected, major crops of Maharashtra such as Bajra, wheat, Jowar and rice were included for developing the model. Dataset for the research was derived from the Indian Government Website with consists of parameters like cultivation area, state, crop, season and district. ANN showed the best results after fitting the model using linear regression with Neural network.

[10] Four machine learning methods namely GPR, KNN regression, Decision Tree and Back Propagation Neural Network were used to compare the prediction Model. Barley production in Iran was the area of interest of this study. Combining field data with remote sensing data was carried out. Field data was collected from government website and remote sensing data was collected from GEE platform. Parameters such as EVI, Minimum Temperature and precipitation was taken into consideration. The study states that the production is also dependent on varying climatic changes. Results show that among all four algorithms GPR gave best results. The model was able to predict the yield one month before the harvest.

[11]Applied techniques such as, LSTM, Q-learning and RNN on the crop paddy for Vellore region in India. Collected Crop Related Weather data of Gujarat Paddy for time period (1997-2012) year were collected, rest of the such as Temperature, Precipitation were collected from government Websitehttps://www.kaggle.com/kpkhant007/gujarat-crop-related weather-data-199720. The results showed that for RNN different errors such as MAE, RSME and MSE were very high compared to other proposed models. The hybrid model LSTM- RNN with Q-learning acquired highest accuracy and R2-Score. The model was examined by executing Light GBM and SVR separately with the dataset, and then evaluating the LGBM-SVR hybrid model and analyzing the differences.

[12] Extracting the trends such as NDVI, average temperature, Air quality index and precipitation which were present in the metrological data was collected from government of India website and Remote sensing data was collected from MODIS for developing the framework. After data collection Image processing is followed by NDVI calculation and then applying the machine learning technique Extreme Gradient Boosting to predict the crop production. The model was used to predict the rice crop in Tamil Nadu.

[13] Multispectral data for wheat and barley from city of Pori was collected using sensors. CNN algorithm was used for prediction and the performance evaluation was done in the terms of Mean Absolute error.

[14] China was the study region, satellite remote sensing data for corn and soyabean were collected from NASA. The machine learning techniques such as ERT, RF ,SVM, and DL were used to build the model. When compared the performance of DL was better among all four.

[15] The large dataset of 7000 vineyard blocks from Australia was selected to train the model. Sentinel-1/2 were used to derive the images for the selected region. ML techniques namely Neural Networks, Linear Regression, Random Forest, SVM Regressor, Ridge Regression and Kernel Ridge Regression were used to estimate the soil moisture. The results showed that slightly similar results were given by neural networks and kernel regression. RF model was performing better among all.

[16] Dataset collected was the MODIS images of Aqua and terra which was from the satellite MODI31Q and MYDI31Q respectively from earth explorer website. SylhetHaor region from Bangladesh was selected as the study region for Boro rice prediction which was compared with the existing model. Brute force technique was used to find the NDVI threshold. By improvising NDVI threshold followed by the

accuracy model gave the best results.

[17] Winter wheat yield prediction from satellite images data was done for the cropland site in Poland and south Africa. Prediction of model was based on NDVI, from Sentinal-2 images 32 different types of indices were calculated. MODIS data allowed the model to predict with best accuracy.

[18] Different techniques such as spatial stream, temporal stream, fusion of spatial

and temporal stream was used for prediction. High spatial resolution (NAIP), High temporal resolution (250m spatial resolution), bi-weekly temporal resolution (MODIS) imagery was used for analysis. NDVI was also taken into reference which helped in predicting the yield more accurately.

[19] Corn yield prediction for the Midwestern US was done. Dataset consists of Satellite remote sensing data from NASA, ESA, CCI and few of the parameters such as NDVI, EVI, LAI, FPAR, GPP and ET was also obtained from images. Climate data from http.www.prism.organstate.edu/ was used which consisted parameters such as precipitation, maximum temperature, minimum temperature, TDmean, VPDmin, VPDmacx. Machine learning algorithmsnamely DL, RF, ERT, and SVM were implemented. Result analysis was done based on MAE, RSME, MAPE, and r which showed that DL method has the highest accuracy with correlation co-efficient of 0.776 and RSME of 0.844 ton/ha.

[20] Soybean yield prediction was carried out in Alabama state Lauderdale County of USA. Dataset used was Satellite images which was derived from NASA's MODIS. 3DCNN technique was used for building the model and the evaluation was done based on RMSE.

3. METHODOLOGY

"Fig. 1" Shows the flow diagram of crop yield prediction.

A. Data Collection

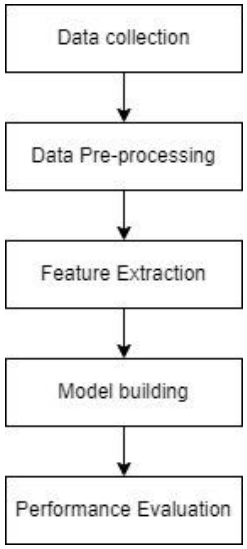

Fig 1. Flow diagram of yield prediction

All machine learning difficulties begin with the data collection process. Because the final model's correctness is a direct reflection of data, the two important things to be taken into consideration while gathering data are quantity and quality of data. Data can be collected from a different place, including Kaggle, Indian government websites, and so on. Files, databases or photos are some of the forms of data that can be collected.

B. Data Pre-processing

The crucial phase in machine learning is data preprocessing. Unstructured data,null values, excessively big values, duplicate values or missing values, may be found in the collected data, affecting the research's outcome. As a result, the data must be preprocessed to remove any contaminants and prepare it for model construction. This stage also involves data visualization, which is necessary for finding data imbalances and correlations among variables.

C. *Selection of Algorithm*

This is the final stage in the data pre-processing process. The problem of selecting

algorithms from a large number is critical. Each machine learning algorithm serves a distinct purpose. The algorithm we choose is determined by our run time, issue statement and data set.As per our requirements we have to select the most appropriate algorithm.

D. ModelBuilding

The dataset is divided into two sections: testing and training. The dataset followed the 80/20 rule. 80% of data is used to train the model,20% of data is used to test the model.Training was modelled using the chosen algorithm. The training stage is referred to as the "heart" of machine learning issues. The built model was then put to the test with the testing set to see how well it worked.

E. Performance Evaluation

Metrics from the machine learning domain were used to assess the model's performance. A range of measures are available for evaluating regression and classification difficulties. The Attributes such as MAE, MSE, RMSE, r2 score and Adjusted r2, are used to evaluate the regression problem's performance. classification problems are solved using confusion matrix, recall, Accuracy, sensitivity,F1 score,specificity, and precision.

F. Deploy the Model

After the model was built and completed the performance evaluations. The model with the lowest error and highest accuracy will be picked to deploy the model for future prediction of real-time problems.

4. CONCLUSION

Machine learning is primarily used to predict real-time issues. As a result, it will be valuable in predicting agricultural yields. Many studies have been conducted to forecast the yield of varieties of crops. The proposed project will look at some yield prediction models in order to evaluate prior work and produce comparison data.

5. FUTURE WORK

The majority of the study work forecasts rice, sugarcane and maize yields based on comparative yield prediction results. This research will be expanded in the future to

estimate crop yields such as jowar, bajada, and others. Only a few input characteristics are taken into account in current crop yield predictions, such as wheat and rice. To improve accuracy, we will evaluate all of the relevant input characteristics for yield prediction in the future.

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Development and Performance Evaluation of Hard Real Time Application on RISC V Processor Series: CASE study on Spacecraft On Board Software VYOMA

Kiran Desai[#], Dr. Vishwanath Y[*]
kiranastro@gmail.com[1] , vishwanath.y@reva.edu.in[2]
School of Computer Science and Engineering
REVA University
Bengaluru 560 064, India

Abstract- Space Industries, dealing with Mission or Safety critical On Board Softwares traditionally use Baremetal Cyclic executives, as they are traditionally proven and are more predictable in terms of behaviour. But as the computational loads, time complexities and parallelism is increasing manifold, its imperative to move towards RTOS based Application development on Single/Multi core processors. With increase in computational loads and parallelism in activities, Avionics industries started moving into multi core processors like Power PC, LEON4 based on ARINC 653 specifications which are proprietary. The operating systems used are VxWorks, RTEMS etc. With advent of Open RISC V architecture, it brings with it a flair of advantages like: openness, modularity, extensibility and stability. Many RISC V designs come with single/multi core architectures with open source RTOS support. In order to establish this tool chain into Space/Avionics industry, we need to develop a prototype, wherein a hard real time satellite application software is executed on RTOS Stack on RISC V series. Another target is to develop a library to allow portable application development on any flavor of RISC V.

In this paper we develop a sample hard real time application and evaluate its performance on an RTOS running on single and multicore RISC V processor. The responses of an RTOS (FreeRTOS) to a multithreaded application, show that Mission Critical Softwares can be coded on a Shakti-C Class Processors. Of course F class will be (extension of C class) will be the best, which will be the future course of work. This paper focuses on evaluating the feasibility of executing Spacecraft On Board Critical Softwares on RISC V Architectures. Current paper focuses on Single core processors.

Keywords: RTOS, Microprocessor, Hard Real Time Systems, RISC V, FPGA, Compiler, Control System, Closed Loop systems

I. INTRODUCTION

Hard Real Time systems work on the assumptions that whether a system succeeds in meeting the deadlines or not. It's a Boolean outcome unlike Soft Real time systems. Generally, HRT systems are Critical systems, failure to which may result in social/financial loss. Spacecraft On Board Softwares are such Mission/Safety critical Software wherein deadlines are of essence. In such systems, selection of Microprocessors and corresponding execution environment plays an important role. Various flavours of Microprocessor cores such as Power PC, ARM LEON3 (SparcV8) etc are extensively used, which are proprietary. Most of the applications in such hard real time systems will be developed in Bare-metal real time cyclic executive software to achieve the required HRT functionalities.

With the advent of Open RISCV architecture [4], it comes along with various advantages such as Layered and Extensible ISA; Common set of shared tools and Development resources; Flexibility to customize processor; Accelerate Time to market etc. With all these advantages, manufacturers and FPGA developers all over the world are developing various flavours of RISC-V Processors with varied applications. In this regard, we have decided to explore RISC V processors and use it for a CASE study wrt a Spacecraft On Board Software application [5] to prove that, RISC V implementation can be used for Space Applications. Study in [5] shows that due to modular and open nature of RISC V, it provides range of alternatives to proprietary solutions in the frame of new architectures for on-

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board embedded systems. RISC V will help in removing monopolistic nature of embedded systems and thereby encouraging academics too to enter into this field.

Hence, current work proposes usage of Shakti C Class processors and its compatible FPGA, Compiler tool chain. In succession to [5], we have put efforts in building a real time application for Spacecraft On board software. With the help of above mentioned tool chain we have developed a typical Attitude and Orbit Control System (AOCS) Application.

II.SHAKTI C CLASS PROCESSOR AND TOOL CHAIN:

The Shakti processor program was initiated by IIT-M RISE group in 2014. Its major aim is to bridge industry and academia by providing innovative and customized solutions without royalties. The Shakti processors designed by IIT(M) come in various classes based on the application at hand to be solved.

For any Development ecosystem to be built for Spacecraft On Board Software development, the following elements are necessary and were selected as shown in Fig.1; [1]

A. *Processor development board:*
ARTY A7 100T FPGA Board was selected.

B. Processor selection:
Shakti C Class Processor was selected. As its new upgraded version (upcoming) from RISE will be Fault tolerant class (F Class)

C. RTOS Selection:
Among existing RTOS flavours like RT Linux, FreeRTOS and Zephyr RTOS: FreeRTOS was selected for development

D. RISC V GNU GCC Compiler

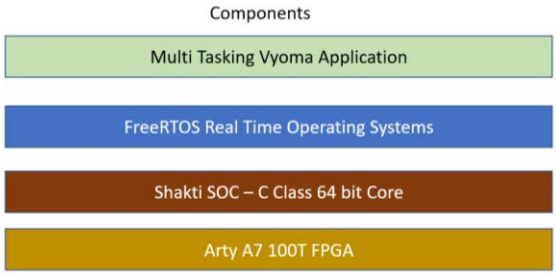


Fig. 1: Shakti C Class Stack

Next Section talks about the architecture design of the prototype to be developed and tested on RISC V Shakti C Class Processor. We have named it Vyoma Application.

III. SYSTEM DESIGN OF VYOMA APPLICATION

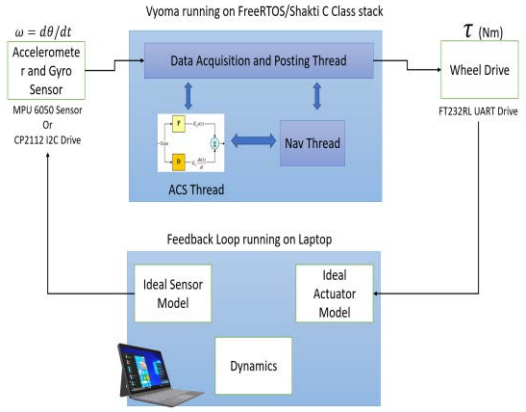


Fig. 2: Vyoma System Context Diagram

Vyoma System consists of the following architectural components:

A. Shakti C Class IP Core:

Shakti C Class IP is compiled using BlueSpec Compiler and Vivado Tool Suite. Generated bit/mcs file is loaded onto ArtyA7 100T FPGA. This FPGA is now configured as Shakti C Class Processor (64 bit single core processor).

B. Vyoma Spacecraft On Board Application:

This application is developed with a conceptual understanding of a multithreaded application running on a FreeRTOS OS stack. The Vyoma application is a multithreaded application consisting of three main threads:

1) ACS (Attitude Control System) Thread

   ACS Thread is responsible for Attitude Control of the Spacecraft, by;

   - Reading the Angular rate Sensor data acquired through Data Acquisition thread ω (radians/s)
   - Convert the rates into Quaternions using small angle approximation theorem

     $\Delta q = (\frac{1}{2})\dot{\omega}$
     $Q = Qbn \times \Delta q$
     $Q = correct(Q)\ (Sign\ correctness)$

   - Compare with commanded attitude of Spacecraft and generate error:

     $$\tau = -K_{rate} \times (\omega_{err}) - K_{prop} \times (2.0 \times Qerr)$$

   - Generate Torque signal
   - This thread runs at 16 ms frequency with 4 ms interval

2) Data Acq Thread: This thread is responsible to
   - Read Sensor (angular rate) from MPU6050 if real sensor is put in loop or CP2112 I2C driver is connected.
   - Also, Its responsible for posting Wheel torque to Wheel drive connected currently to UART FT232RL Drive.
   - This thread runs at 4 ms frequency with 2 ms interval

3) Nav Thread: This thread is kept for future Kalman Filter Design, NI etc which will help in providing Precise Navigation information to Vyoma
4) Software Timer Thread: This is a timer, which is initiated and is responsible for triggering all other threads in a timely manner. Timer runs at 1 ms frequency.

Some of important salient features of the application:

1) Based on Nyquist Sampling, Sampling is 2 times faster than the PD Controller computational rate.
2) As explained in the Fig3, after a brief initialization of all state variables and devices, a timer interrupt is initiated, which at regular intervals, based on the Thread frequency specified, triggers execution.

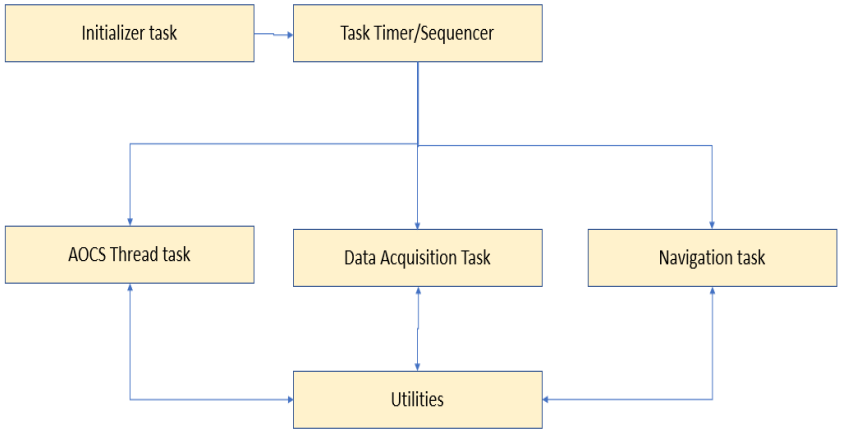


Fig. 3: Multi threaded architectural view

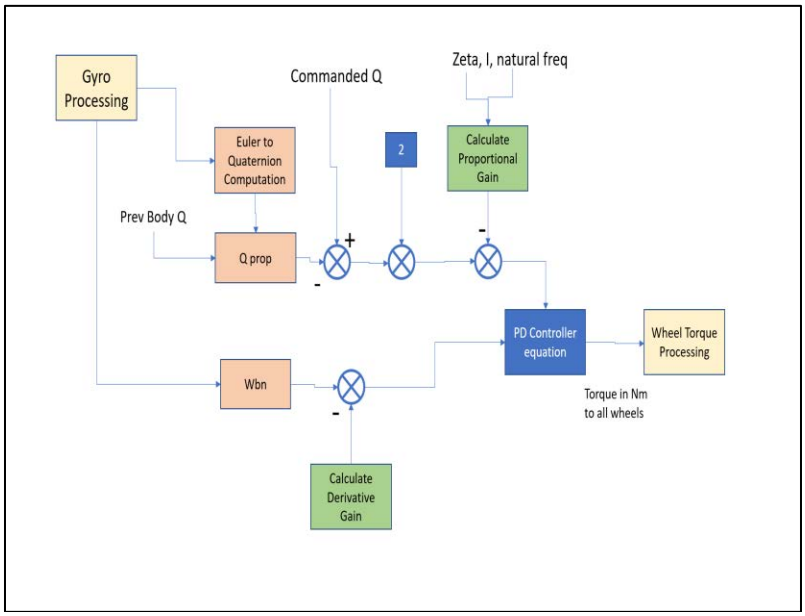


Fig. 4: Controller details of Vyoma Application

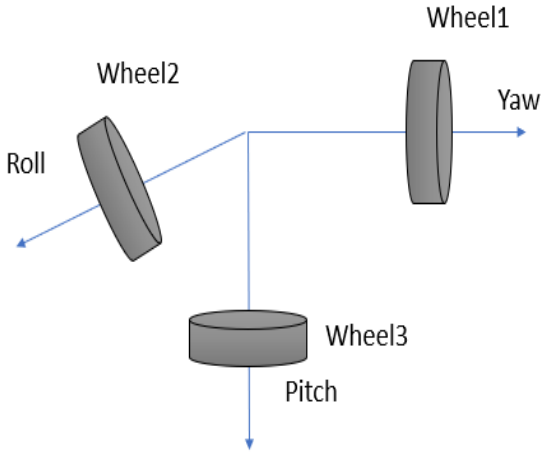
3) The Architecture developed is portable enough to be run on an POSIX based RT-Linux, of course its not yet experimented.

C. *Spacecraft Dynamics:*

Following are the simulations done at the Laptop, to simulate Spacecraft environment;

1) Actuator Model: Wheel Model

An Ideal Wheel is modelled with Torque distributed to all the three wheels (each mounted in each principal axis of Body)



UART driver provides wheel torque to Actuator Model, and based on Spacecraft Inertia (which is considered to be only along Principal axis Ixx,Iyy,Izz) is Integrated to body momentum. This momentum is integrated to form the angular rate and Wheel momentum. This Body rate so computed is fed to the sensor model

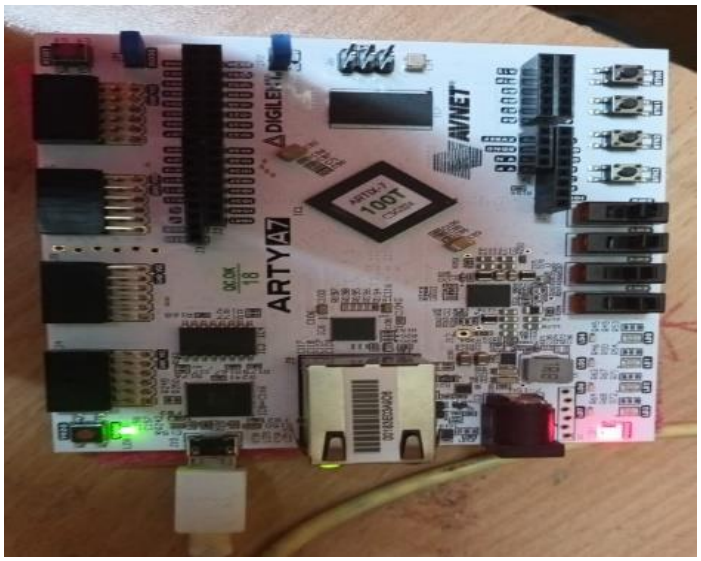
2) Gyro Sensor Model: This sensor model takes rates as input as passes through the sensor model, which takes care of various sensor characterstics such as;
   - Sensor Bias
   - Sensor Gaussian Random noise
   - Misalignment factors
   - Drift rate of Gyro

   Based on the model constructed from above parameters, we compute the Gyro rate and is fed through CP2112 I2C drive, thus closing the loop
   The Gyro model, provides rate along all the three axis in sensor frame. For ideal conditions, we have considered sensor frame and body frame are aligned with each other.

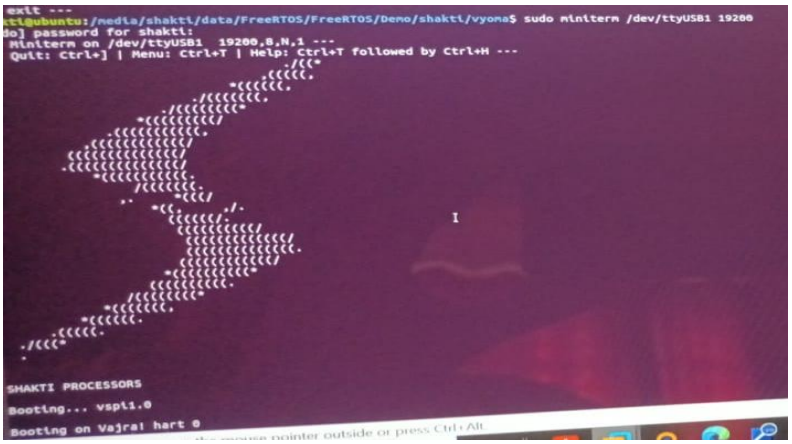
IV. SETUP AND RESULTS OF EXECUTION

The Entire hardware setup in its current state looks like below images;

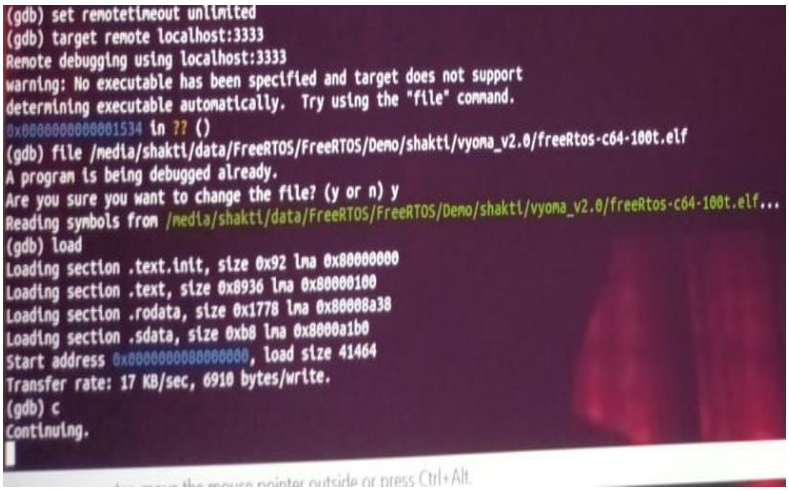
1) Development board powered on:



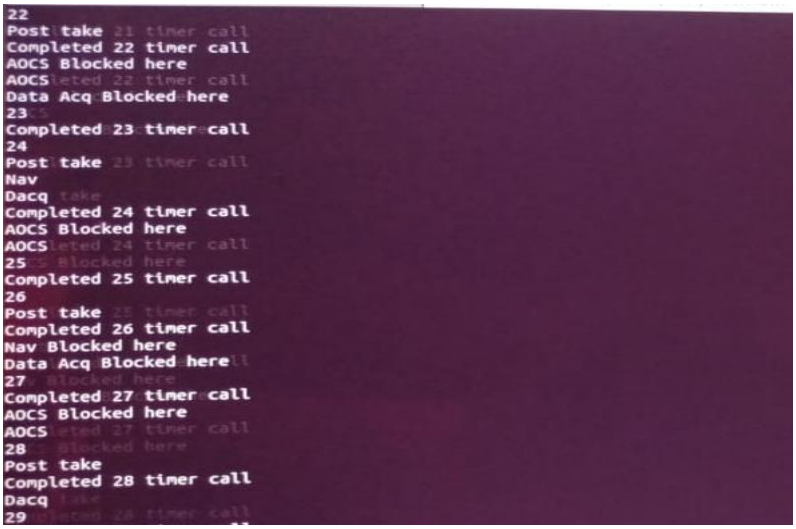
2) Shakti Powered ON:



3) Connecting through OpenOCD and GDB:

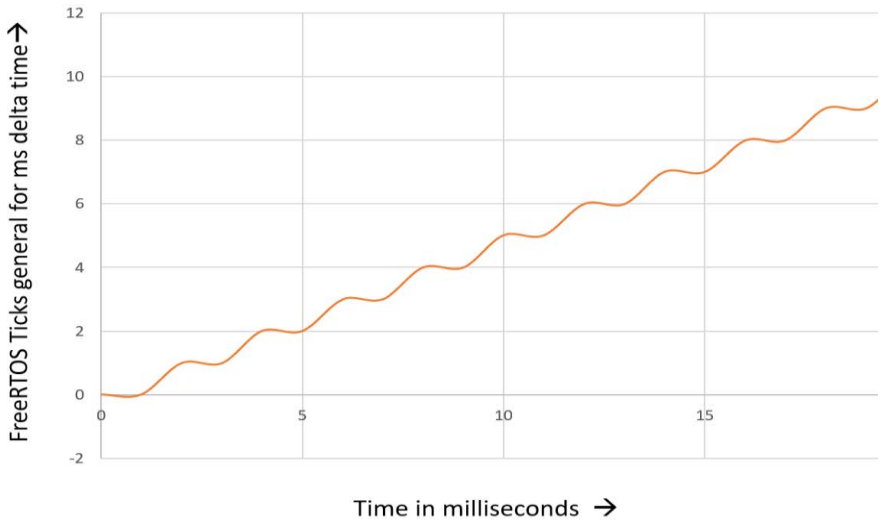


4) Execution of Threads:

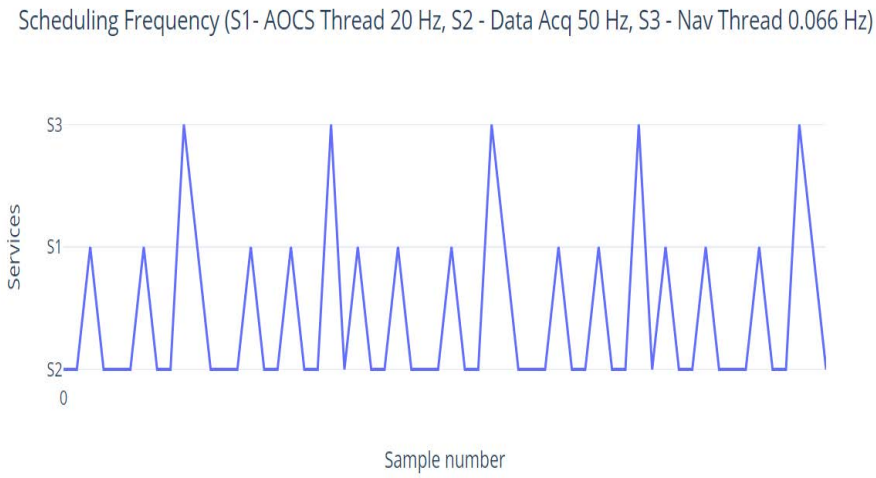


5) Time tick response of FreeRTOS:

As the threads are of minimum 4 ms revisit time, we have 2 ticks available from FreeRTOS which provides necessary trigger for threads to start. FreeRTOS [6] in current implementation provides, 1 tick/2ms. Efforts have been ON to make it much finer of the order of 0.5 ms, taking care future requirements.



6) Thread Response with Frequency 50 Hz, 20 Hz, 0.066Hz. Scheduler used in FreeRTOSConfig file for the same is Fixed Priority Preemptive Scheduling [6]. As can be seen, since Service S1 is of higher priority, pre-emption of S3 takes place as soon as S1 frequency has come into effect. With the above results, its imperative that RISC V and FreeRTOS combination is providing suitable environment for Engineers to use the tool chain. Further closed loop studies are under way to prove it effectiveness furthermore.
7)



V. FUTURE WORK

Current work focussed on setting up architectural and detailed design of Space craft On board Software on Free RTOS RISC V stack on a single core on an experimental basis. Future work encompasses:

1) Portability prototype development between RT-Linux and FreeRTOS
2) Performance enhancement and evaluation on Multi core Shakti Processors [2]
3) Performance evaluation on Fault Tolerant F-class processors
4) Development of comprehensive Guidance and Navigation Control Software for Satellites wrt Academic purpose

VI. CONCLUSIONS

With the above results, we can tell that the Vyoma architecture defined over RISC V - FreeRTOS stack for a single core is able to meet hard deadlines as specified by the application. Hence, We can consider RISC V C class processor and FreeRTOS stack suitable for Hard Real Time Applications.

ACKNOWLEDGMENT

Authors deeply acknowledge the support by Director, Reva School of Computer Science and Engineering and the entire academic team. We are also extremely thankful to Vice Chancellor in going ahead with this initiative.

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Elite Navigation System For Visually Impaired People

Waheed Khan M[1], Sandesh Gowda S G[2], Vipin Kushwaha.[3], Spandana[4], Prof. Shrikanth M S[5]

[1,2,3,4]School of Computer Science Department, [5]Assistant Profesor, Reva University, Bangalore, India

Abstract.

Blind people face extreme difficulty to navigate in and around their surroundings, they need external assistance to help them to get from one place to another. They also face security threats; our main goal is to help blind people to be independent and move wherever they need with ease without facing any danger. A major goal of this paper is to help with movement and safety of blind people. In this paper, we propose object detection with voice feedback with the help of the YOLO V5 algorithm and image reorganization using OpenCV to help identify the kith and kin of the user and to store the images of strangers. Moreover, we use language translation to change Voice Feedback to the desired language (Hindi). Furthermore, we also have distance estimation using ultrasonic sensors

Keywords— Object Detection, Image Recognition, YOLO V5, OpenCV, Language translation, Distance Estimation.

1. INTRODUCTION

Sight is a wonderful present that gives us the ability to perceive things. It allows each person to take a glimpse and understand all scenes. In the illustrated activity, the visual eye is constructed and made realistic to enhance your flexibility for blind and handicapped people outside the area. This paper presents a project that can help impaired people to match their world using their ability to listen. It is an optical-based project that combines key parts with effective internet technology. Project input will be photo/video, the picture is clicked and observed and then connected to IoT innovations. The entity is then acquired, and voice data is transmitted to the handicapped person via gadgets. The program is aimed to create a finer life as it is a new technology that has many advantages and has an intention to help the blind person.

Sight defect is an unusual case that is deficient in optical identification because of neuro components. Based on a recent survey, millions of people are optically impaired, and billions are partially to completely affected. Vision plays an important role in every individual life. Loss of sight has enormously affected people both physically and mentally.

2. LITERATURE REVIEW

[1] The SOS Navigation System is built into the Smart Walking Stick for the Blind. the year 2018— Saurav Mohapatra is ranked first, followed by Subham Rout, Varun Tripathi, Tanish Saxena, and Yepuganti Karuna.

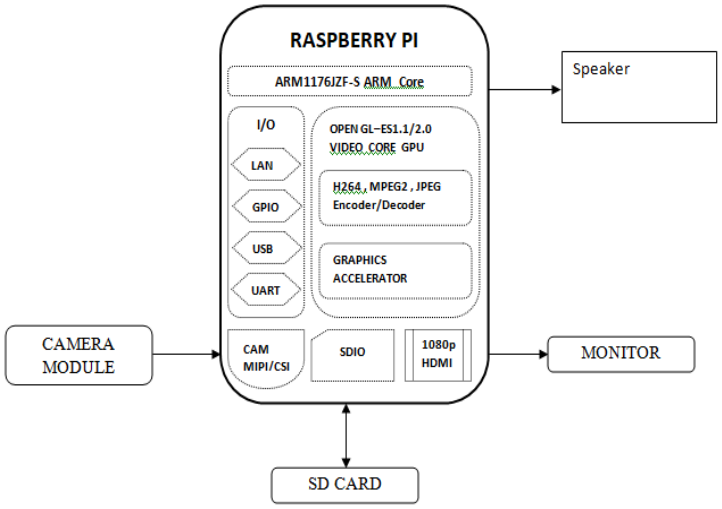
[2] A Voice-Activated Blind Stick with an Emergency Trigger the year 2021— Priyanka Abhang (1st), Shambhavi Rege (2nd), Shrishti Kaushik (3rd), Shriya Akella (4th), and Manish Parmar (5th).

[3] Ultrasonic Blind Stick Designed To Help Completely Blind People Avoid Obstacles : Arnesh Sen, Kaustav Sen, and Jayoti Das are the candidates for 2020.

[4] Fall Detection System Based on Smartphone with Accelerometer and Gyroscope Year: 2015 — 2Lukito Edi Nugrohoi, 3Widyawani, 4Kurnianingsihi.

[5] The OneNET Internet of Things development platform was used to design and implement an intelligent walking stick. Year:2019— 1 Bo Wanga, 2 Wei Xianga, 3 Yu Quan Mu1d, 4 Zheng Wu1e

3. METHODOLOGY



Projects consist of mainly Raspberry Pi , Camera , Speaker
Mainly Project contains two modules

1. Fall detection using accelerometer
2. Object Detection and Recognition
3. Open CV for face recognition

Module 1:

Fall detection using accelerometer:

This system uses an accelerometer that is tri-axis and has a gyroscope in the smart gadgets. The fall noting system makes use of several ways used by past researchers. This mainly used line acceleration in axes 'X', 'Y', and 'Z'. The gyroscope sensor has three parts- roll, tone, and yawn. These are defined as (gX), (gX) and (gZ).).

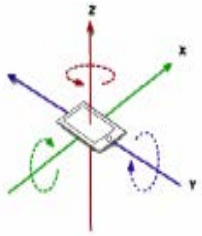


Fig. 1. Axis of the gyroscope ond accelerometer

Based on these results from the accelerometer, the magnitude of the axis is defined as:

$$AT_t = \sqrt{aX_t{}^2 + aY_t{}^2 + aZ_t{}^2}$$

Meanwhile, the gyroscope uses the formula :

$$GT_t = \sqrt{gX_t{}^2 + gY_t{}^2 + gZ_t{}^2}$$

After finding the size of the gadgets and the sensor, it is important to enter the extremes of the sensor. Below is the formula for finding the maximum and minimum

$$\text{MAX}[AT_t..AT_{t-n}] \text{ dan MIN } [AT_t..AT_{t-n}]$$
$$\text{MAX}[GT_t..GT_{t-n}] \text{ dan MIN } [GT_t..GT_{t-n}]$$

values:

Once we get the extremes of the sensor, below is the formula to get the value sought:

$$angle_{(x,y,z)} = \arccos\frac{acc(x,y,z)}{g} x180$$

The fall detection method is split into several sections.. It works based on the user's first movement It then differentiates between extreme value and finally by a particular limit. Next, a specific angle is considered to estimate if a person is falling or standing (suppose falling to be low) . This is used to estimate if a user has really fallen. If the result meets the condition, the threshold value is calculated further. This is then used to direct if a person has encountered unexpected acceleration. Finally, after the completion of all the points, the last thing to look at will be the direction of fall. Here is the flowchart of the application made.

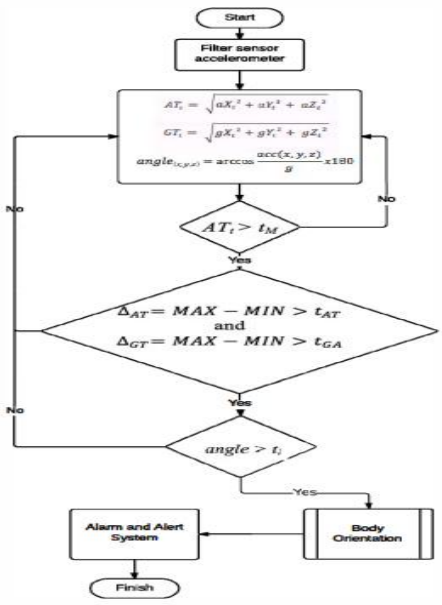
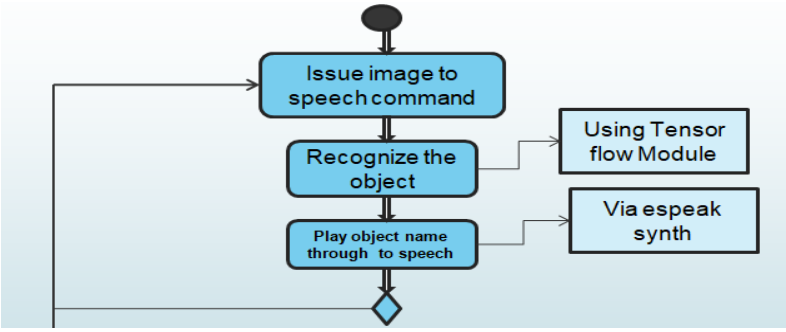


Fig. 2. Flowchart of the Falling Detection Algorithm

Module 2:

Object Discovery and Release:

Video monitoring is a method to analyze video sequence. It is an active agent of computer vision. It provides a massive data storage and display facilities. There are three video surveillance services. Video monitoring actions can be personal, independent or fully independent. Personal video surveillance means analyzing the video by a person. Automatic video surveillance consist of video processing with a significant amount of human intervention. Make finding simple movements. Only if there is a significant movement the video is recorded then sent for analysis. With a completely independent system [10], the only inclusion is a monitored video.



Module 3:

Open a CV for facial expressions:

OpenCV is a database of highly targeted editing tasks to detect real-time computing. It was founded by Intel, later funded by the Willow Garage and Itseez. It is a free to use

library under the BSD license. OpenCV provides in-depth learning frameworks, TensorFlow and Cafe.
It makes use of C ++, Python and MATLAB connections and supports Windows, Linux, Android and Mac OS. With the help of MMX and SSE commands, OpenCV depends on real-time vision applications. CUDA and OpenCL are in the process of fully being integrated. This is supported by over 500 algorithms and 10 duplicate functions. OpenCV is originally written in C ++ and has STL containers interaction.
OpenCV began as an Intel Research project to create deep CPU systems, real-time ray tracking and 3D display walls are a part of the project. OpenCV project objectives were defined as:

- The development of vision theory provides open codes and also has basic vision infrastructure. No renaming the wheel.
- Publicize vision to provide same infrastructure for developers to build and transfer the code easily.

Improve vision-based applications making it portable, and open source – No license needed for code to be released.

4. CONCLUSION

The Elite Navigation System is a game-changing innovation in navigational and rehabilitation technology for the blind and visually impaired. Its goal is to increase blind and visually impaired people's confidence and engagement in the world, allowing them to live as active and self-independent lives. They may move around without any body assistance. This is a navigational package tool built for visually impaired person this guide system can be improved with devices which will be available even smaller as this kit .
Further we have improved to detect the faces of the person which the user knows, which helps the blind in field.

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Collating Deep Learning Architectures Efficacy for Detection of Brain Tumor

Sai Chandan, P V Bhaskar Reddy, M B Preeth, Laeequllah Khan, Md.Maheboob

School of Computer Science and Engineering,
REVA University, Bengaluru.

Abstract.

Brain Tumor is a medical phenomenon where differently abled cells escalate inside a Human Brain. The explication of the Tumor in an individual's Brain at a pilot stage becomes extremely prominent for diagnosing it successfully. Early scrutiny of these tumors aids the medical operations as well as effectuates the possibility of a person being cured. Diverse outlook has been consummated for the indagation of Brain Tumor inside a host encapsulating the Machine Learning and Deep Learning prospects. Detection of different types of Brain Tumors has also been imposed to aid the surgical discernment. The explications around this malady have led to the development of modular approaches with eminent efficacies. Certainly, with higher accuracy, the complexity of the modus operandi increases. For developing the automated system for Brain Tumor Detection, the elucidation has to be on Computational Complexity and the Instances utilized. In this articulation, we have subsumed diverse Deep Learning Architectures for Brain Tumor Detection engaging open-source Brain MRI Images. Specifically, we've collated algorithms which are Light-weight and Heavy-weight in terms of their architecture i.e., on the basis of Size, No. of Parameters and Depth. MobileNetV2, DenseNet121, InceptionV3, InceptionResNetV2 and ResNet50 are the selected Deep Learning Models which have been trained over Binary Class Dataset expelling the Output as 'BT' and 'NBT' for Brain Tumor Detection. The output we achieved in terms of Accuracy was phenomenal and also gave us a prominent insight over the behavioural outlook of Deep Learning Architectures over a particular Dataset. For the validation of the performance of each utilized structure we inculcated quantitative prospect as well.

Keywords— Deep Learning (DL), Brain Tumor (BT), Convolutional Neural Network (CNN), No Brain Tumor (NBT), Magnetic Resonance Imaging (MRI).

1. INTRODUCTION

Brain Tumor stands out to be one of the most complicated maladies procured by an individual. There are majorly 03 types of Brain Tumor namely: Glioma, Meningioma, and Pituitary [1]. The development of extra mass i.e., Tumor, inside a Brain causes Brain Haemorrhages [2] due to increased pressure intrinsic to the Brain. People affected by Brain Tumor in 2019 was aggregated to be 0.7M. Moreover, 0.86M people had been diagnosed in the US, where 60K were Benign and 26K were Malignant [3]. The fatality rate of Malignant Patients in the US stands at 65% with the survival approximation consummating to 35% [4]. As a result, MRI Images are utilized to detect the presence of

Brain Tumor in a particular person. Thus, radiologists, through their experience contemplates the existence of a Tumor in an individual's Brain. Plethora of Automated Systems has been formulated for Brain Tumor Detection incorporating state of the art technological prospects. But, the ignorance in terms of Computational Complexity can be visualized. Deep Learning Models surpassed Machine Learning Models in terms of accuracy, due to addition of Hidden Layers, which thereby increased the overall complexity of the model. When we're dealing with Medical Operations it's extremely important to build a system which is less complex and which is fast in producing results.

Therefore, we inculcated diverse pre-trained models such as MobileNetV2, DenseNet121, InceptionV3, InceptionResNetV2, and ResNet50 based on certain parameters such as "Size" and "Depth" for Brain Tumor Detection. We aggregated MRI Brain Tumor Images from Open-Source Platform i.e., Kaggle and pre-processed it. We initially thought of creating a Multi-Class Dataset which would give us the type of Tumor a person is possessing, but then through greater explication we thought of creating a 02-Class Dataset, as Detection of a Tumor stands out to be more prominent when compared to the Detection of type of Tumor in real-time. The inculcation of less and more complex Deep Learning Models gave us an elucidating outlook over the impact of Depth on diverse problem statements. The efficacies we got through our proposed modus operandi, stood out to be the best when compared to the pre-existing ones. We incorporated not only the Train, Validation and Test Accuracies for the juxtaposition but also different metrics based on Confusion Matrix such as F1-Score, Recall, Precision, along with AUC and Cohen Kappa Score for advance scrutiny. The proposed explication demonstrates the Brain Tumor Detection in the most efficient manner and also diminishes the orthodox modular outlook.

2. LITERATURE SURVEY

Before initiating with the proposed modus operandi, we scrutinized the pre-existing methodologies induced for Brain Tumor Detection which gave us an overview about the possible outlooks. Image Segmentation technique had been imposed for extracting dominant features for Brain Tumor Detection aggregating 96% accuracy with the limitation of the Dataset exhibited [5]. Utilization of Variational Model for analysing Glio-Blastoma affected patients got an efficacy of 85.7% which is extremely less when analogized with other modus operandi's [6]. An efficacy of 95% was procured through the collation of Convolutional Neural Network (CNN) with K-Means for Brain Tumor Detection with shortcoming of increased model complexity [7]. A minimum and maximum correctness i.e., 88% and 96% respectively was obtained through inculcation of Fully Convolution Network (FCN), but had issues with the real-time actuation [8]. 03-Class Dataset was formulated for classification of different types of Brain Tumors i.e., Glioma, Meningioma and Pituitary through Convolutional Neural Networks (CNN) which gained an efficacy of 96% [9].

The amalgamation of R-CNN and Support Vector Machine (SVM) Classifier was also formulated for Brain Tumor Detection utilizing high-resolution Brain MRI Images which was able to procure an efficacy of 95% [10]. Moreover, CNN surpassed Discrete Wavelet Transform (DWT) when imposed over MRI and Positron Emission Tomography (PET) Instances [11]. A comparative analysis between CNN Model (which was built from scratch) and VGG16 (a pre-trained Model) was also carried out where the CNN gave an

accuracy of 91.6% whereas VGG16 gave an accuracy of 91.9% [12]. 98% F1-Score was achieved when Xception Model (a heavy-weight model) was incorporated and 97.25% was achieved when MobileNet (a light-weight model) was utilized [13]. A Binary Classification CNN Model was formulated with the Outputs as "Tumor Detected" and "Tumor Not Detected" gaining an accuracy of 96.08% and F1-Score of 97.3% [14]. Brain MRI Images of 150 Patients were collated and were imposed over Deep Convolutional Neural Network (D-CNN) contemplating Cohen Kappa Score of 0.91 and AUC of 0.95 [15]. Automated Heterogenous Segmentation inducing Support Vector Machine (SVM) was also formulated for Brain Tumor Detection through Image Segmentation colligating an efficacy of 98% [16].

The Literature Review gave us an elucidation of the shortcomings of the already executed architectures. Thus, hovering over all the technological modus operandi's, there were some loopholes which we observed and rectified and induced it in our proposed approach.

3. METHODOLOGY USED FOR ANALYSIS

We instantiated with our methodological workflow through colligating the Dataset. Rather going in for the "Type of Brain Tumor" Classification, we stuck upon the "Actuality of a Tumor" Classification in a Human Brain. Thus, we dissected our Instances into a 02-Class Dataset namely 'BT' and 'NBT'. The Data Balancing has been elucidated in Figure.1.

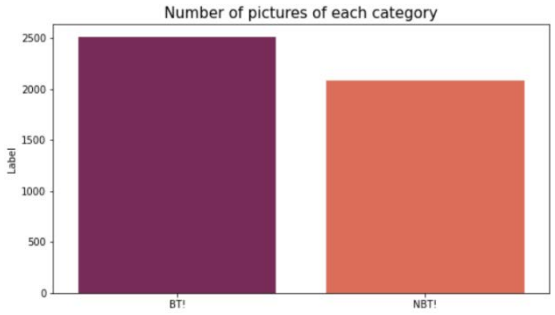

Fig.1. Data Balancing Overview for a 02-Class Dataset.

Moreover, we encapsulated varied Deep Learning Architectures for amalgamating it with the Dataset but inhibited building a model from scratch as it would increase the overall complexity of the modus operandi. There are certain prominent prospects which affects the operation of a model and makes it more complex which are as follows: 1] More Parameters (Exceeding Millions of Parameters). 2] More Recurrent Units (Consisting of more Convolutional Operations). 3] Complex Activation Functions (Not selecting Activation Functions as per the Problem Statement) 4] Deep Networks (With Increased Depth in terms of Layers). Commemorating the above elucidation, we constricted ourselves to specified models exhibited in Table-1. Table-1 demonstrates the parameters over which the models were selected i.e., Size of the Models (In Mega-Bytes), No. of Parameters in a Model (In Millions), and Depth of the Model (Number of Layers). We tried to collate the Light-weight as well as Heavy-weight Systems for greater insights.

TABLE I. MODEL SELECTION DEMONSTRATION

S.No.	Pre-Trained Models	Size (In MB)	No. of Models Parameters (in M)	No. of Layers
1.	MobileNetV2	14	3.5	88
2.	DenseNet121	33	8	121
3.	InceptionV3	92	23.8	159
4.	ResNet50	99	25.6	168
5.	InceptionResNetV2	215	55.8	572

Representation of Structure of each utilized Model:

A. MobileNetV2: MobileNetV2 possesses 88 Layers into its architecture along with 3.5 million Parameters. The Size of the Model is 14 MB and stands into Light-weight System category. Figure.2. demonstrates MobileNetV2 Architecture.

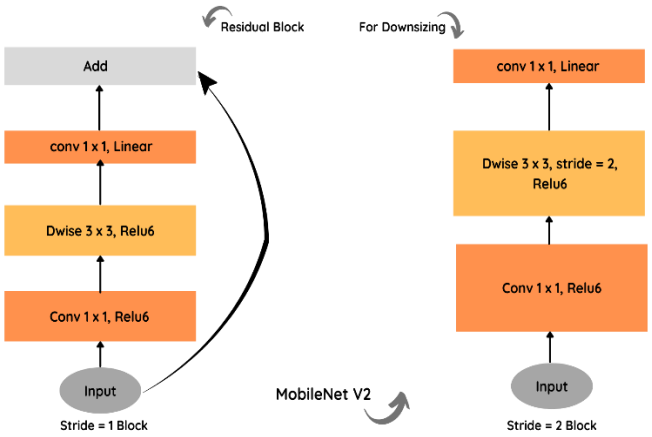

Fig.2. Architecture of MobileNetV2.

B. DenseNet121: DenseNet121 possesses 121 Layers into its architecture along with 08 million Parameters. The Size of the Model is 33 MB and stands into Light-weight System category. Figure.3. demonstrates DenseNet121 Architecture.

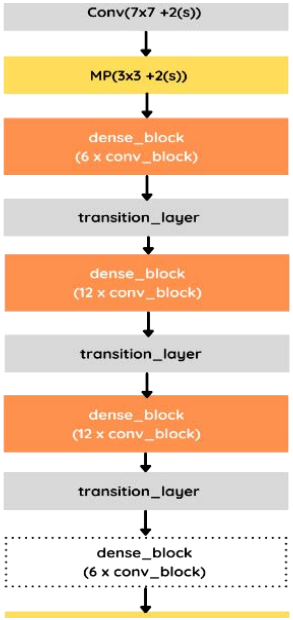

Fig.3. Architecture of DenseNet121.

C. InceptionV3: InceptionV3 possesses 159 Layers into its architecture along with 23.8 million Parameters. The Size of the Model is 92 MB and stands into Heavy-weight System category. Figure.4. demonstrates InceptionV3 Architecture.

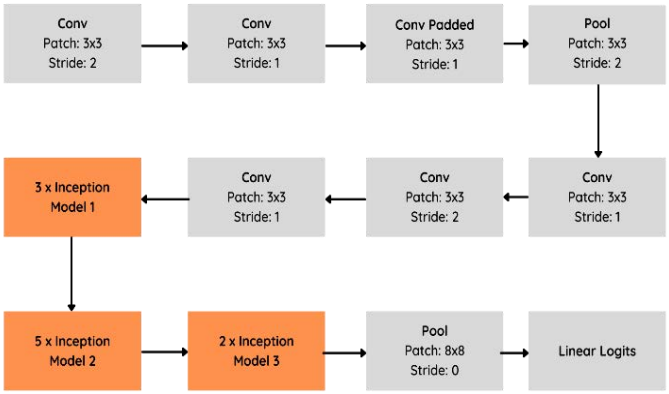

Fig.4. Architecture of InceptionV3.

D. ResNet50: ResNet50 possesses 168 Layers into its architecture along with 25.6 million Parameters. The Size of the Model is 99 MB and stands into Heavy-weight System category. Figure.5. demonstrates ResNet50 Architecture and Figure.6. demonstrates Residual Identity Mapping Structure.

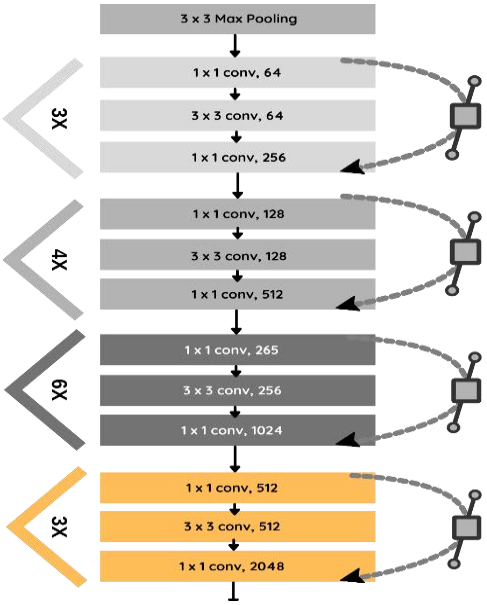

Fig .5. Architecture of ResNet50.

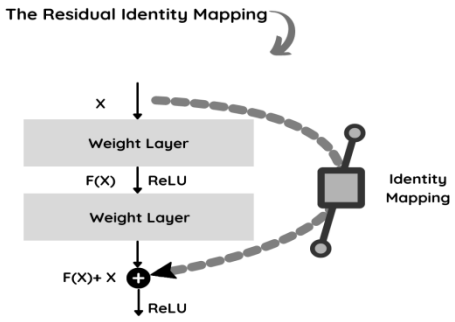

Fig .6. Architecture of Residual Identity Mapping.

D. InceptionResNetV2: InceptionResNetV2 possesses 572 Layers into its architecture along with 55.8 million Parameters. The Size of the Model is 215 MB and stands into Heavy-weight System category. Figure.7. demonstrates InceptionResNetV2 Architecture.

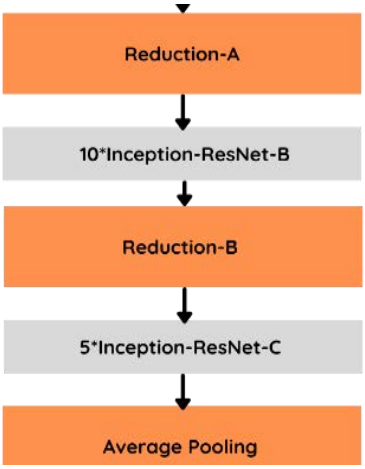

Fig.7. InceptionResNetV2 Basic Architecture.

4. IMPLEMENTATION AND TOOLS

After explicating the Deep Learning Architectures, we initiated the implementation workflow for obtaining potent outlook.

A. About the Dataset: We collated authentic Brain MRI Images [17], from the open-source platform i.e., Kaggle. To increase the number of Instances we infused varied Brain MRI Images into a Primary Folder. As the resolution were different for different datasets, we resized it to 224x224, as we utilized the pre-trained models [18].

There was total 2513 Images of Brain Tumor Positive and 2087 Images of Brain Tumor Negative giving us a sum of 4600 Image Samples. For increasing the training size of the Dataset, we also used Data Augmentation [19] through which our total dataset value increased to 55,200 Instances. Figure.8. demonstrates the visual aspect of the Dataset.

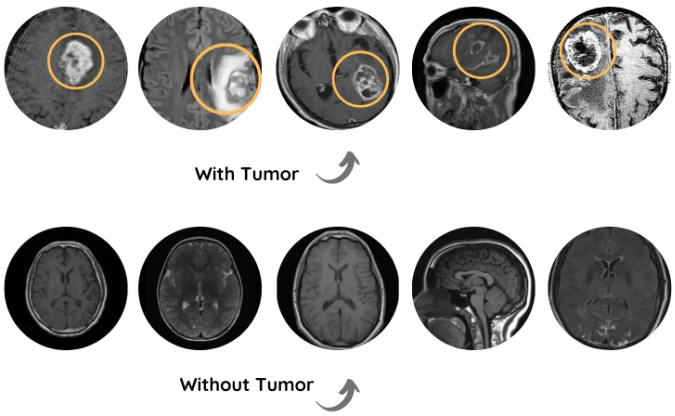

Fig .8. Visual Representation of Collated and Processed Brain MRI Images.

B. Tools Utilized: The frameworks we utilized were TensorFlow and Keras. We also used Image Data Generator for Data Augmentation. We trained our model over free GPU provided by Kaggle Notebook IDE.

C. Metrics Utilized: The Train, Validation and Test Accuracy had been elucidated for gaining certain insights. But, for greater validation we inculcated some more metrics based on Confusion Matrix such as F1-Score, Recall, Precision.

Also, we infused Cohen Kappa Score which gives the agreement rate between the evaluators along with Area Under Curve (AUC) Score which gives Degree of Separability Score.

Both the Scores range between 0 to 1, i.e., score near to '0' stands to be least effective and score near to '1' stands to be most effective. Figure.9. demonstrates the Metrics Overview.

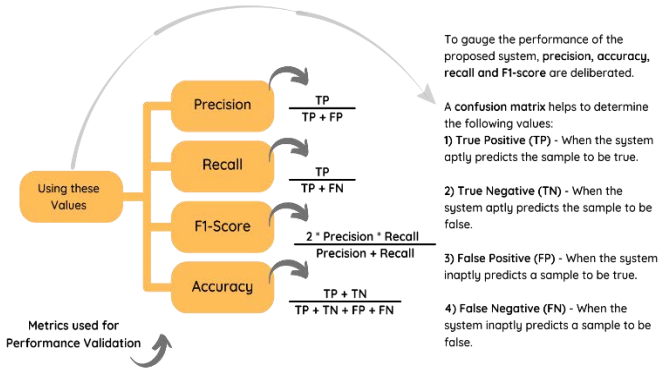

Fig .9. Overview of the Metrics Utilized.

D. Proposed Modus Operandi: Illustrated in Figure.10.

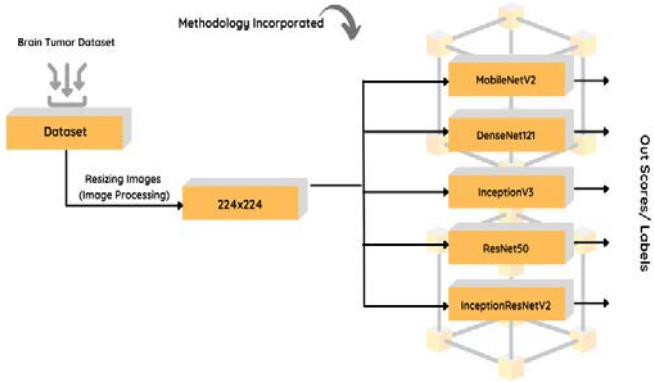

Fig .10. Implementation Structure with Full Process.

5. RESULTS THROUGH EXPERIMENT & ITS ANALYSIS

After the Actuation, the results we procured were overwhelming which is illustrated in Figure.11, Figure.12, Figure.13 and Figure.14.

Prowess of our modus operandi reflected in our Graphical Outlook.

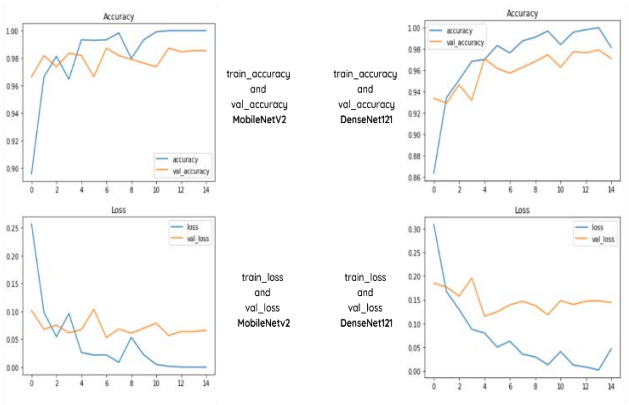

Fig .11. MobileNetV2 and DenseNet121 Graphical Results.

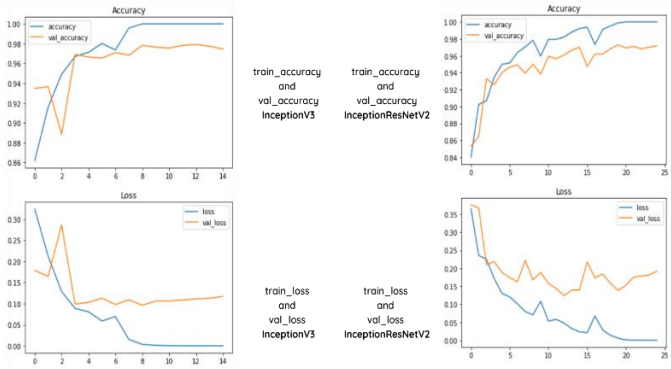

Fig .12. InceptionV3 and InceptionResNetV2 Graphical Results.

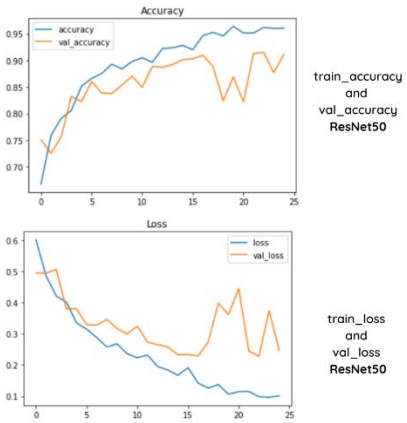

Fig .13. ResNet50 Graphical Result.

TABLE II. TRAIN, VALIDATION AND TEST ACCURACIES

Model	Train-Accuracy	Validation-Accuracy	Test-Accuracy
MobileNetV2	99.60%	98.64%	99.30%
DenseNet121	99.42%	98.11%	98.45%
Inception V3	98.30%	97.44%	97.36%
ResNet50	96.55%	94.72%	96.06%
InceptionResNetV2	98.46%	97.44%	97.55%

TABLE III. COMPARATIVE ANALYSIS OF DIFFERENT MODELS BASED ON CONFUSION MATRIX

Model	AUC	Precision	Recall	F1-Score	Cohen Kappa Score
MobileNetV2	0.9987	0.9935	0.9934	0.9934	0.9866
DenseNet121	0.9965	0.9871	0.9842	0.9842	0.9729
InceptionV3	0.9945	0.9737	0.9738	0.9738	0.9674
ResNet50	0.9877	0.9611	0.9609	0.9609	0.9491
Inception-ResNetV2	0.9956	0.9739	0.9745	0.9745	0.9650

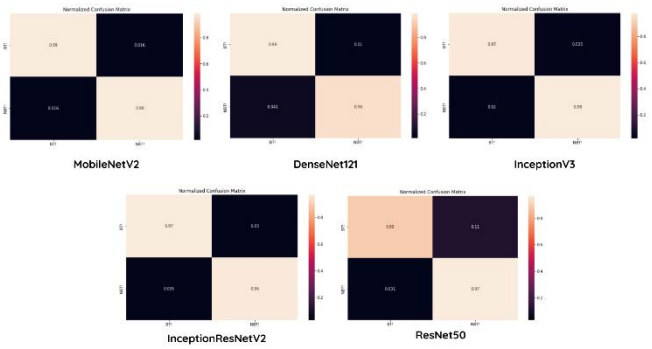

Fig .16. Illustration of Confusion Matrix for each Utilized Model.

6. CONCLUSION AND FUTURE SCOPE

The Experimental Results depicted the domination of Light-weight Systems in terms of Accuracies. MobileNetV2 and DenseNet121 exhibited the phenomenal outlook for the real-time exegesis. ResNet50, InceptionV3 and InceptionResNetV2 contemplated potent results but was not as per the expectations as these models were greater in Depth.

Thus, through this explication we got an ideation that the efficacy of any modus operandi doesn't depends upon the depth of the model. To be more precise, the pre-conceived notion of a Deep Learning prospect of "More the Depth, More the Extracted Features" isn't true all the time.

Thus, the performance related to MobileNetV2 was extremely high when compared to already existing workflows. As a result, for the real-time implementation we selected MobileNetV2 as our good-to-go Model. Moreover, more dataset can be contemplated for more potent results. Also, the pre-processing outlook has to be encapsulated when training any model, as it impacts the overall performance of a system in any situation.

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Unusual Activity & Weapon Detection in an ATM using Deep Learning

Shiva Kumar R Naik, Rahul S, Ravi Teja S, R L Varun, Samadhi Pavan Kumar,
School of Computer Science and Engineering, REVA University

Abstract– As the world is advancing, we've started using automation in almost every aspect of our lives. Also, as we're growing in the 21st century, the real world is getting a little more advanced, and advancement in technology and other things brings drawbacks and some negative impacts on society. ATMs – Automated Teller Machines – are one of the most common locations for criminals to attack people for money or simply steal money from an ATM. Nowadays, almost all banks have started keeping security guards at ATMs, but it's not so cost-effective to keep them there 24 hours a day, and sometimes human error does occur, as a result of which we come across situations where even security guards are injured by criminals trying to loot the ATM. Even installing CCTV cameras has not been able to minimise such incidents.

In such situations, there is a demand for an automated system that can alert the authorised people regarding any unusual activity inside the ATM room. Taking video as input and taking 3 major points in reference: a. wearing a helmet; b. use of a knife; c. detection of gun system can alert authorities.

Key Words Deep *Learning, Convolutional Neural Network, CCTV- Closed Circuit TV, Safety, Automation.*

I. INTRODUCTION

An unusual activity and weapon detection system for ATMs is a system that finds out if any suspicious activity is happening at the ATM or if anyone has entered with a gun or knife. It helps save precious lives or valuable money for banks or individuals. Many banks depend on CCTV cameras, but there will always be human errors, as humans tend to lose focus after a while, and it's not possible to monitor CCTV footage each moment. With this system, we're trying to solve one of the biggest problems banks are suffering from: not being able to monitor ATMs 24/7. Banks have to recruit security guards, but that is not cost-effective, and it doesn't solve the problem.

Visual/optical surveillance is a well-known field of study with a wide range of applications in human unordinary monitoring systems, public safety in places like banks, shopping malls, and private areas, automated event detection, motion-based identification, human tallying, actuality, mobile robot navigation, and other fields. Rapid advancements in the availability of high-quality, low-cost video recording equipment, supercomputers, and growing demand for analysis of such tapes have sparked widespread interest in and demand for video surveillance in almost every industry.Finding out mobile objects and then identifying those at movies, on the other angle, is very significant and critical. Separating things from the background, on the other hand, is a challenging but necessary task.

As a result, it's critical to comprehend the video's content as well as the context of the items. Items derived from those other background objects have become a significant issue. As anoutcome, interpreting the film and its factors with the shown outlines becomes a very important criteria. The predictable goal of the unforeseen activity detection process is to identify a typical human behaviour strategy. The method is designed at the beginning with respect to a standard dataset of some activity. The useful facts and facts are then matched to the format during confirmation. In the end, it is concluded whether the action is anticipated or not. The demand for a designated regular human activity strategy makes unusual activity detection challenging in real-world security systems.

II. Literature Survey

In this section, we talk about the systems or papers that have been implemented before, which would help us to get the optimum result in the end. In this paper, researchers proposed a unique way of finding unusual human activity in crowded places. Clearly, instead of finding out or subdividing a person, they suggested or proposed a very effective method, what they called a "motion influence map," to constitute a person's activities. The major characteristics of the put-forward motion influence map are that it constructively shows the motion or shifting characteristics of the motion pace, motion aspect, and dimension of the material or

object and those' interactivities inside a frame pattern. By applying the put forward motion influence map, scholars in-depth proposed a simple outline in which they would be able to identify both regional as well as global unusual activities [1].

In a research paper, developers focused on analysing two states that, if disregarded, may put human lives at high risk. Among them are detecting prospective gun-based offences or violations and identifying deserted luggage on frames of observation footage. Developers presented a deep neural network model that can immediately find guns in images. Developers also presented a machine learning as well as a computer vision-based pipeline which would detect deserted baggage so that we could identify prospective gun-based offences and deserted baggage conditions in monitoring footage [2].

Overcrowded visuals pose new challenges to livestream assessment that conventional approaches cannot address. In this paper, researchers present a novel statistics based working outline for modelling the regional spatio-temporal movement sequence nature of overly crowded places. Their key perception is to make the most of the heavily dense interest of the overcrowded visuals by designing the major movement sequences in regional regions, thus constructively holding the fundamental innate constitution they appear in on the screen. In simple terms, they modelled the motion difference between regional space-time capacity and their spatial-temporal demographical nature to distinguish the overall nature of the given moment in any video. They demonstrated that by capturing the stable state movement nature with the indicated spatio-temporal movement pattern representation, we could easily find an unusual activity such as statistical or demographical divergence. Their experiment demonstrates that regional spatio-temporal movement trend representation yields pledging real results with activities that are difficult to perform and that are difficult to analyse even for human speculation[3].

The challenges in detecting new-born are unique and challenging. In this paper, scholars identified a major problem of jaw contour being less distinct in this particular case. They proposed a multi-label CNN based system which detects facial action unit usual habits of new-born. They used an extension of FACS for new-born. They tried to give an alternative to manual coding which isautomatic AU detection to find new-born expressions [4].

III. OBJECTIVES:

a) To design a model for implementing the abnormality detection algorithm to detect unusual activities.
b) To record the video from the camera when any unusual activity is detected while the absence of the operator.
c) To provide an instant alert of video containing the unusual activity.

IV. METHODOLOGY

A. System Design and Architecture:

Modern society's biggest security problem has a solution now. The system is one step towards safeguarding precious lives and hard-earned money.
The proposed system is based on CNN and Deep learning.

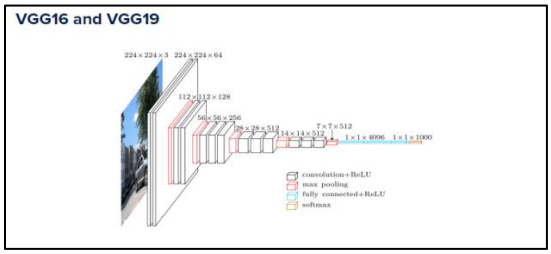

Fig1. Visualization of VGG Architecture

Every layer of a CNN puts in a well-defined set of filtrations, generally, thousands or multitudes of them, after which it puts together the results before passing the outcome into the next upcoming layer of the network. While training, CNN tries to learn the value systems for these filtrations instantly.
In terms of image classification, our CNN might learn to:

- In the first layer, the image is determined from raw pixel data.
- In the second layer, use these corners to identify shapes (i.e., "blobs").

- In the network's highest layers, use these forms for inferential analysis characteristics such as facial characteristics, car parts, and so on.

The final layer of a CNN employs these higher-level features that make forecasts about the image's contents.
An (image) convolution in deep learning is an element-wise linear combination of two matrices accompanied by a sum.

1. Consider two matrices (both of themhavingthe same dimension).
2. Multiply them element by element, (not by the dot product, but by a simple multiplication).
3. Add all the elements together.

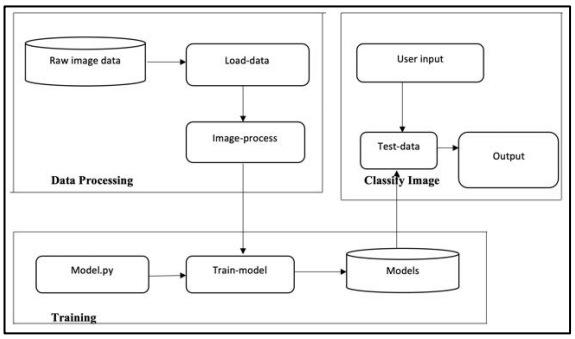

Fig2. System Architecture

B. DATAPROCESSING

Data processing refers to the process of transforming data from one form to a much more usable and preferred shape, i.e. making it much more relevant and instructive. This entire process could be automated with the help of machine learning methodologies, computational analysis, and statistical data. Based on the job at hand and the machine's requirements, this entire process can produce charts, films, diagrams, tables, pictures, and a variety of other file types.

a. Raw Image Data: We collect image data/datasets for training and testing purposes.
b. Input: Now that the data has been prepared, it may be in a format that is not machine-readable, so some conversion methods are required to transform it into a readable format. Excellent calculation and precision are required to complete this task. Data can be gathered from a variety of sources, including MNIST Digit data (pictures), Facebook posts, music recordings, and video clips.
c. Processing: This is the phase when algorithms and machine learning approaches are needed to accurately and efficiently execute the commands given over a vast volume of data.
d. Output: At this level, the machine obtains results in a substantial way that the user may easily deduce.Reports, graphs, movies, and other forms of output are possible.
e. Training: We can now use the photos in our training set to train our network.The purpose of this task for our infrastructure is to identify how to recognise every one of the groups in our data sets. If the model shows an error, it learns from it and tries to do better the next time.
f. Evaluate: Finally, we should assess the performance of our perfectly-trained squad.This project demonstratesevery oneof the photographs in our trial sample to the system and communicates it to assume whatever the picture’s tag is. The model's forecast for a photograph in the trial or test data isfinally calculated.

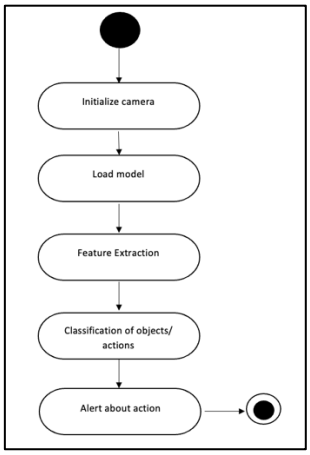

Fig3. Activity Diagram

C. PROPOSED SYSTEM

Using CNN, the proposed method can distinguish human movementsin anovercrowded situation and determine if the activity or movements is normal or odd. We'll create a deep teaching method to classify the dataset's behaviour. A picture is fed into the system. It categorizes this data into one of several categories (usual and unusual s). An ensemble of CNNs, as well as image preparation processes and neural networks (NNs) which mix the image characteristics from the CNNs along with the image, construct the system. The ensemble uses unweighted averaging to combine the NNs' outputs into a set of forecast possibilities for the classes. The classification is based on the maximum likelihood.

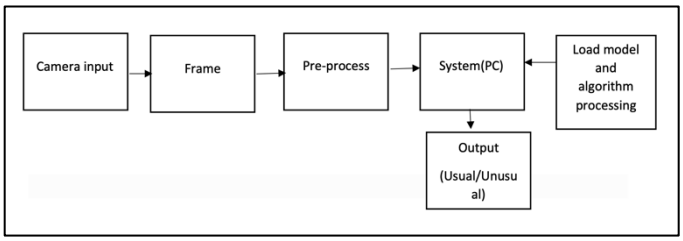

Fig4. Block Diagram

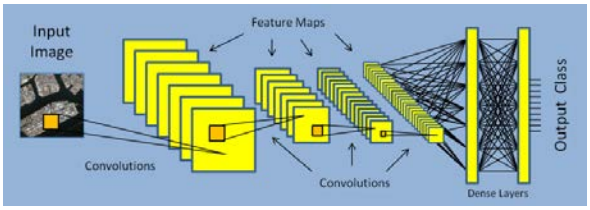

Fig5. The structure of aCNN. The input image is passed via a set of image feature detectors.

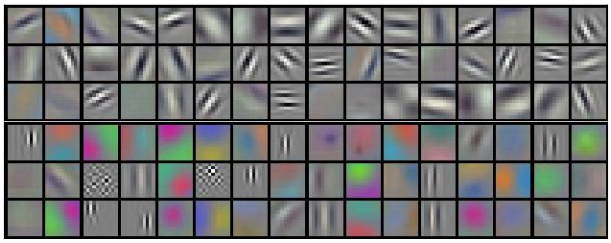

Fig6. The above image shows the Example of the image feature detectors that a CNN might "learn" during its training.

As shown in Fig. 5, a CNN is made up of multiple processing layers. Each layer is made up of a group of convolutional filters that identify visual details. The Gabor-like and colour blob filters depicted in Fig. 6 are feature detectors in the early stages.

Higher-level feature detectors are formed when layers are added. The CNN mixes the sensor outputs in fully linked "dense" layers near the conclusion of the series, satisfaction was found in a set of possibilities, one for each class. CNNs, dissimilar toprior methods such as SIFT and HOG, do not necessitate feature detectors being designed by the algorithm designer. As it trains, the network learns which characteristics to look for and how to recognize them.

V. IMPLEMENTATION

A. IMAGE FUNDAMENTALS

Pixels: The Building Blocks of Images

Pixels are indeed the basic building blocks of an image. Each image is composed of pixel resolution. The pixel is the most fine-grained granularity obtainable. A pixel is commonly regarded as the "colour" or "intensity" of illumination that would seem in a particular location in our image. When regarded as a grid, every square in an image contains a single pixel. Take a look at Figure 7 for an example. Figure 7 depicts a picture with a reliability or pixel density of 2500, which also means it is 500 pixels wide by 500 pixels tall.A picture can be thought of as a (multidimensional) matrix. Our matrix contains 500 columns (width) and 500 rows in this example (height). In total, our image contains 500 X 500 = 2500 pixels.
Most pixels are denoted or understood in the following ways:

a. Grayscale/single channel
b. Colour

In any grayscale picture, each pixel has a numeric value which falls between 0 and 255, with zero relating to "black" and 255 relating to "white." There are several shades of grey between 0 and 255, with countnearer to zero becoming darker and countnearer to 255 being lighter. Picture7 depicts a grayscale gradient picture, with darker pixel resolution on the left side and shinier pixel resolution on the right side. Colourful pixels, on either side, are normally represented using the RGB colour space.

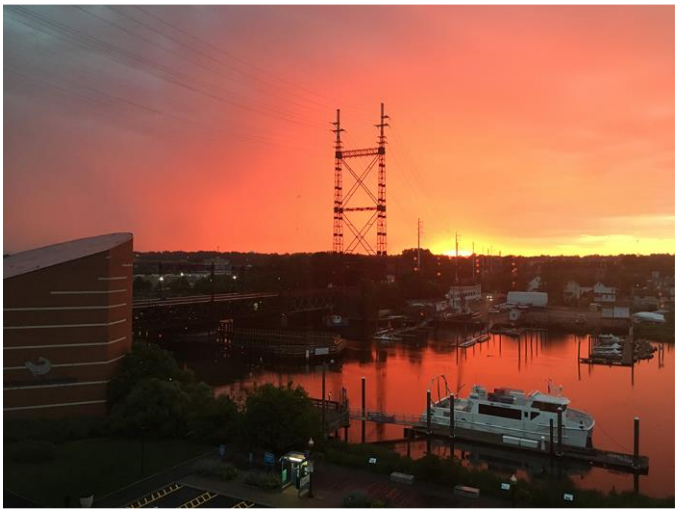

Fig6.Image having 1000px width and 750px height makes total of 75,000 Pixels(Image for demonstration only, actual size may vary)

Fig7. Image gradient showing pixel values going from very dark: black (0) to lighter: white (255).

B. IMPORT VIDEO AND INITIALISE FOREGROUND DETECTOR

The goal of mobile person identification is to separate people-related regions via the remainder of an image pattern. For motion segmentation, background prediction is an especially well-liked method. Even though the background is not stationary, the background scene modelling is analytically learnt utilizing the redundancy of image intensity in a training stage. Each pixel's redundancy information is saved individually in a history map that depicts the intensity variations at different pixel locations. Instead of analyzing the whole video right away, the specimen begins by collecting abeginning frame buffer in which the

movable things are separated from the backdrop.This aids in the progressive introduction of the video processing stages. To initialize the Gaussian mixture model, the foreground identifier needs a fixed amount of clip frames. The first 50 frames in this example are used to begin three Gaussian modes in the probabilistic model. Following the learning, the identifier starts to produce increasingly accurate segmentation results.

C. PROCESS THE REST OF THE VIDEO FRAMES

The leftover video frames are processed in the last stage. The differential approach for motion estimation is a frequently used method in computer vision. It works by assuming that the flow in a local neighbourhood of the pixel under examination is largely constant and then solving the fundamental optical flow model for every single pixel in that localityutilizingthe basis of the minimum square. The approaches can typically overcome the inherent uncertainty of the motion equation by merging the data from many neighbouring pixels. It's also less affected by image noise than point-based approaches. However, because it is a strictly local approach, it is unable to offer flow information inside uniform parts of the image.

D. ACTION RECOGNIZATION

The purpose of activity recognition is to analyze ongoing occurrences from video/live data in an automatic manner. This part of the project recognizes actions depending on objects, preferableto a human model, and successfully identifies several fundamental actions. Wearing a helmet, carrying a knife and a rifle, and so on.

VI. OUTCOMES

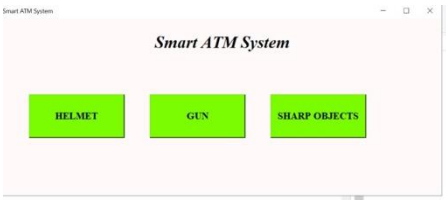

Fig8. GUI

Fig9. Knife Detected by Camera

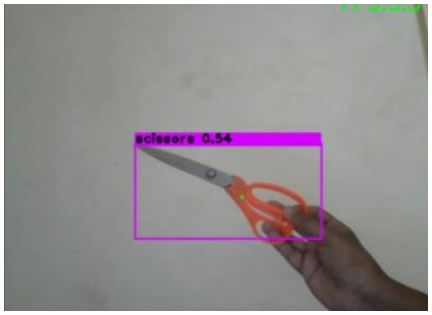

Fig10.A sharp object like Scissors Detected by the camera

Fig11. Helmet Detected by Camera

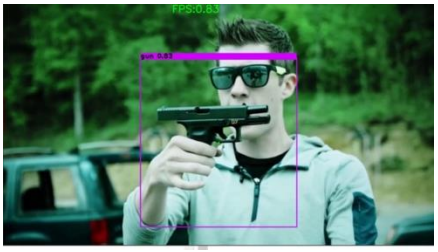

Fig12. Gun detected by Camera

VII. CONCLUSION

In our daily life when we see human-to-human interactivity andmutual interactions, recognizing unusual conduct is critical. Because it comprises information about just a person's identity, character, and psychological condition, it is difficult to draw out.

One of the main topics of research in the science topics of machine learning and computer vision is the human ability to recognize other people's behaviours. As a result, multiple activity recognition systemsare required for many multimedia applications such as surveillance systems, human contact, and robotic systems for human behaviour portrayal.

Suspicious behaviour in public spaces is harmful and can have major ramifications. Different methods are based on the acquisition of video sequences that detects motion or pedestrians, but computers are not clever enough to identify suspicious conduct in thereal world.

Thus, a system built is helpful in real-life scenarios. Large scale implementation is easy and low cost since all the ATMs will have CCTV connected already. Recognition of unusual activitywith a weapon or sharp object detection from live video input along with an automated messaging system makes this unique from existing ones.

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THE BENEFITS AND APPLICATION OF MULTIMEDIA ELEMENTS IN INFORMATION

[1]K. Saraswathi, [2]V. Lakshmi, [3]S. Geetharani, [4]S. Selvakumari

Department of computer Science, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Email: saraswathik5511@yahoo.com (**K.Saraswathi***) Corresponding author:* K.Saraswathi

ABSTRACT

Uses a variety of media (text, audio, graphics, animation, and video) to convey information or entertain the user in a variety of ways. Storage and consumption of multimedia content through electronic media are also included in the definition of multimedia. Mixed media in fine art is similar to multimedia, but with more impact. The term "rich media" refers to any kind of multimedia that may be interacted with. By comparing the effectiveness of multimedia components in computer-aided learning with their production costs, this study examines how effective multimedia education may be at the college level. Teachers and students alike regard interactive multimedia components to be among the most powerful tools for enhancing teaching and learning.

There are several factors that influence how well multimedia is utilised in teaching and learning. These factors include how content is delivered, how it is presented, and how it is tailored to students' individual needs. Every presentation now includes some kind of multimedia. Uses range from entertainment to education have been discovered for it. Multimedia content is becoming more important as internet use increases.

Keywords: multimedia, graphics, animation, video, educational technologies.

INTRODUCTION OF MULTIMEDIA

When compared to more conventional forms of media, such as written matter or audio recordings, which included little to no user engagement, multimedia is a method of communication that incorporates a variety of information types into a single interactive presentation. Animated videos, audio slideshows, and video podcasts are all forms of multimedia.

Multimedia may be saved on computers, laptops and other electronic devices for playing either on demand or in real time, making it possible to watch it later (streaming). Multimedia's word "rich media" was formerly used interchangeably with "interactive

multimedia." Multimedia was added to the World Wide Web via hypermedia extensions throughout time.

It is possible to include multimedia components into a computer-supported teaching and learning environment in order to accommodate a range of student learning styles. It may be costly and time-consuming to provide training that incorporates aspects of on-line text, hypertext, graphics, sound, and video.

HISTORY OF MULTIMEDIA

.[1]Intermedia," a new technique to artmaking coined by American artist Dick Higgins two years before, may have occurred to Goldstein. [2] Even if the phrase "multimedia" didn't exist at the time, the notion of a "whole artwork" can be traced back to Richard Wagner, who composed in the late 1800s and early 1900s. Wagner aimed to achieve a perfect synthesis on stage by fusing opera, theatre, and music. He despised the Grand Opera at the time because it placed more emphasis on individual skill than on the total piece. Wagner firmly thought that the most profound works of art might be created by fusing these disparate mediums. [3]

In 1966, Variety's Richard Albarino used the phrase "multi-media music-cum-visuals" to describe the "Lightworks," a song written and performed by "Washington Square" comedian Bob Goldstein..

The following are some of the most significant events in the field of multimedia in computing: During World War II, Bush authored an article about Memex. It was at MIT in 1967 when Negroponte established his Architecture Machine Group. Nelson & Van Dam's hypertext editor at Brown University in 1969 1971 - Email 1976 - Architecture Machine Group proposal to DARPA: Multiple Media. Aspen Movie Map by Lippman & Mohl The Electronic Book was a backer in 1983. The MIT Media Lab was founded in 1985 by Negroponte and Wiesner. In 1989, Tim Berners-Lee presented the CERN with a proposal for the World Wide Web (European Council for Nuclear Research) Apple Multimedia Lab, 100 personnel, educ. in 1990 - K. Hooper Woolsey in 1991, the Apple Multimedia Lab released Visual Almanac and the Classroom MM Kiosk The year was 1992, and it was the year of the first Internet multicast of M-bone audio. In 1993, the National Center for Supercomputing Applications (NCSA) at the University of Illinois developed the NCSA Mosaic web browser. It was 1994, and Jim Clark and Marc Andreesen were working on Netscape at this time: In 1995, JAVA was introduced as a platform-independent programming language. This is the first applet, and it's named after Duke. Microsoft released Internet Explorer in 1996.

CATEGORIES OF MULTIMEDIA

1. Linear and non-linear multimedia may be categorised as such. Linear active content is similar to a cinema presentation in that the spectator has no control over the material. Non-linear content allows the user to manage their own progress, such as in a computer game or self-paced computer-based instruction, by allowing them to engage with the material. Hypermedia is another term for non-linear material. Live or pre-recorded multimedia presentations are available. Using a navigation system, a

recorded presentation may be interactive. In a live multimedia presentation, the presenter or performer may be able to engage with the audience.

2.
3. Live or pre-recorded multimedia presentations may be used.
4. There are two ways in which a multimedia show may be interactive: through the presenter or performer or by using a navigation system.

4. FEATURES OF MULTIMEDIA

On stage, projected, broadcast, or played locally on a media player—all of these options are available for viewing multimedia presentations. If a broadcast is recorded, it may either be live or pre-recorded. Analog or digital electronic media technology may be used for broadcasts and recordings. You have the option of downloading or streaming digital internet content. Live or on-demand streaming of multimedia content is possible. Online networks, offline computers, or simulators may all be utilised to play multimedia games and simulations. They can also be used in special effects-enabled physical environments [1]-[5].

By integrating several types of media information, the amount of interaction may be increased. However, the outcome may differ according on the kind of media you're using. Online multimedia is gradually becoming object-oriented and data-driven, allowing applications with collaborative end-user creation and customization of many forms of content over time.. of content.. It's possible to adjust the multimedia "experience" in a variety of ways without having to rewrite the code for things like photo galleries that enable users to edit both the images (pictures) and the titles (text) inside them.

5. APPLICATIONS

Advertising, art, education, entertainment, engineering, medical, mathematics, business, scientific research, and spatial and temporal applications are just a few of the many uses for multimedia.

The following are a few examples of multimedia applications:

It's a creative industry: Fine arts, entertainment, commercial art, journalism, and media and software services are just a few of the fields that make use of multimedia in the creative industries. During the course of their career, a multimedia designer might work in a variety of different mediums. Technical, analytical, and artistic talents are all in demand.

Much of the electronic old and new media used by commercial artists is multimodal. 5.2 Commercial: Advertising relies on captivating visuals to capture and hold viewers'

interest. Innovative multimedia presentations that go beyond standard slide displays to sell concepts or enliven training are often prepared by creative services businesses for use in industrial, business-to-business, and interoffice communications. Commercial multimedia designers may also be employed to create for government and non-profit applications.

The entertainment sector also significantly relies on multimedia, particularly for creating spectacular effects in films and cartoons. Many people like playing multimedia games, which may be downloaded or purchased as CD-ROMs. Multimedia components are also included in certain video games. The term "Interactive Multimedia" refers to software that allows users to actively engage in the presentation of information rather than just receiving it passively [6]-[10].

Educational materials, such as computer-based training courses (often referred to as CBTs) and encyclopaedias and almanacks, make extensive use of multimedia. There are many different types of CBTs, and the user may choose the one that best suits their learning style. To combine education with entertainment, particularly in the form of multimedia, is known as educainment.

Use of multimedia in computer simulations may be used for everything from entertainment purposes to educational purposes, such as military or industrial training. 5.5 Engineering It is common for designers and software developers to work together on multimedia for user interfaces.

Industry : Multimedia is utilised in the industrial sector to convey information to shareholders, managers, and other employees. The use of almost limitless web-based technology makes multimedia an excellent tool for offering staff training, promotion, and product sales all around the globe.

Modeling and simulation are the primary uses of multimedia in mathematical and scientific research. There are a number of ways a scientist may change the molecular model of a given chemical, for example. Journals like the Journal of Multimedia publish representative research [11]-[14].

A virtual surgery or a simulation of the effects on the body of viruses and bacteria transmitted

via the human body may be used to teach physicians in medicine.

5.9 Multimedia in Public Places: Stand-alone terminals or kiosks for information and assistance will be provided at hotels, train stations, shopping malls, museums, and grocery shops. In addition to saving money by eliminating the need for conventional information booths and staff, these automated systems can operate 24 hours a day, seven days a week, even when human support isn't on duty.

To increase access to data, material, expertise, and other resources, multimedia is essential. As Wang points out, by enhancing students' practical experience, multimedia may compensate for some of the shortcomings of more conventional teaching approaches. Multimedia is used to teach students how to put their newfound skills to use.

Students, particularly those with impairments, benefit more from a multi-media presentation than from a single medium. Modern multimedia material may be saved on a variety of media, including high-capacity hard drives, flash drives, and even cloud systems. This improves the contents' availability, storage capacity, and simplicity of use. Multimedia material is also good for the environment. People don't have to accumulate more paper-based information since they may choose their multimedia material depending on their current needs. **CHALLENGES OF MULTIMEDIA**

Initial challenges include finding data that can be transformed and shown in a multimedia format. The multimedia should appropriately represent the data. In addition, competent persons are required to update and manage the contents of multimedia files. In order to meet the needs of a large number of students, academic material must be updated regularly. By letting go of old ways of doing things, individuals may be more receptive to new, cutting-edge ways of doing things. The Internet is another important consideration when it comes to accessing a variety of publications. People, on the other hand, should exercise caution when deciding what they want to learn from multimedia. An expert review is required before a piece of multimedia may be posted online to determine whether or not it is of any use. Users of data may suffer damage as a result of inaccurate or manipulated information.

As a result, it is critical that data and information be accurate. Authenticated persons should verify it before posting it online. Data analysis should also be carried out by persons who have undergone training. If the educational data mining approach, medical data analysis, or corporate information analysis is used incorrectly, it will provide inaccurate findings. As a

result, data must be thoroughly evaluated in order to provide the best possible predictions about the future. Another important issue is maintaining constant access to the network. There is a significant influence on the availability of multimedia-based material dependent on the quality of the connection.

Groves argues that the goal of a study is to provide recommendations and reflect advancements in theory and practise. Testing, surveying, content analysis, phenomenological approaches and focus groups are some examples of research procedures. Other forms include exploratory and qualitative research as well as assessment studies. To uncover patterns in data, the method of knowledge detection is used in databases. Personalized academic materials are available via a web-based learning system that was built just for you.

This paper's theoretical framework was laid out throughout the research phase. Models cannot be explained without a theoretical framework. Structured data is essential, as this theoretical understanding shows. Using a variety of approaches, this study employs a hybrid approach. The Grounded theory is based on examining past behaviour to generate new ideas.

CONCLUSION

Even if it is true that one of the ultimate aims of multimedia language teaching is to stimulate students' interest in and enthusiasm for learning the language, the establishment of an ELT context should be built on transparency and openness in the teaching materials. We anticipate that the usage of multimedia English instruction will continue to grow in the future as technology advances.

The ability to reach a wider audience has been greatly aided by the integration of many forms of media. Humans must use caution and education in order to weigh the benefits of various options against the drawbacks. Thus, this research is critical to the overall success of multimedia in people's lives across the world. Students will have more control over the learning process, but it will take less time. Consequently, the quality of instruction will be enhanced, and students' applied English communication will be successfully nurtured, which means that students' communicative ability will be honed. As a consequence, we feel that this procedure may assist students develop their ability to think creatively and effectively, which is essential to achieving and achieving an effective educational outcome.

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COVID-19 Severity Prediction with Machine Learning

Raghavendra A, Samarth D Valmiki, R Hemanth Kumar, Kuruva Hithendra SaiKumar, Harshini R

School of Computer Science and Engineering, REVA University

Abstract. The cumulative occurrence of the novel Coronavirus (COVID-19) is hastily growing and impacted 196 international locations and territories with the USA, U.K, Italy, Spain and followed by India. Numerous research stated that the disorder because of CoV-2 is extra risky for humans with susceptible and weak immune systems. Travel records of inflamed topics may be tracked automatically, to take a look at epidemiological correlations with the unfolding of the disorder and to make contributions to this information, several researchers are reading the exclusive dimensions of pandemic and giving out the effects to assist humanity. To make contributions to the present-day human crisis, our strive on this is to look at is to make a severity analysis system for COVID-19. The software can be developed for this idea to inspect and test the spreading of infectious diseases, so as to predict patient severity based on medical records effectively. Making use of health and travel data using ML algorithms to identify COVID-19 infected persons. Analyzing the factors which play an important role in predicting the severity of COVID-19 infection in the patient.

Index Terms — Coronavirus, Severity, Framework, Pandemic, Predictive models.

I. INTRODUCTION

he novel Coronavirus disease was first reported in China, on December 2019. It quickly spread over the globe. The causal virus's cumulative incidence quickly raised and affected 196 nations and territories, with the United States, Spain, Italy, United Kingdom, and France were among the most affected followed by India. The World Health Organization declared the outbreak of the coronavirus a pandemic as the virus continued to spread. The potential of CoV2 to spread rapidly through human contact, with roughly 20% of those infected becoming asymptomatic carriers, distinguishes the pandemic generated by CoV2 from related viruses such as SARS and MERS. Furthermore, according to various studies, the sickness induced by CoV2 is more dangerous for persons who have a weak immune system. The severe effects of COVID19 are more likely to affect the elderly and individuals with life-threatening conditions such as diabetes, neurological diseases, coronary artery disease, and AIDS. CoV2's behavior necessitates the creation of a solid mathematical foundation for tracking its spread, as well as the creating tracking mechanism for making quick and correct online judgments. New solutions are needed to generate, manage, and analyze large amounts of data on the incidence of conditions, patient data, and community activity, as well as to integrate clinical trial data, medications, genetics, and public health data. Researchers can predict where and when the disease will spread by combining this data with machine learning (ML) and artificial intelligence (AI) and warning those areas to be prepared.

The main motivation for the COVID-19 Patient Severity prediction based on the patient's record is the global havoc it has created, and the suffering people are undergoing through this. In this paper, we are trying to build a Machine Learning model to predict the severity of a patient based on their previous medical records and travel history. As it is known that a

patient's previous health state plays a gargantuan role in deciding whether a person can survive the pandemic, we have decided to use Machine learning to check and tell who suffers the most specific and allied factors for the severity of infection on the patient.

II. LITERATURE REVIEW

[1] COVID-19 Outbreak Prediction with Machine Learning provides many outbreak prediction modals for COVID-19, which may help people around the area to make mindful selections and take measures. Among the same old fashions for COVID-19 worldwide pandemic prediction, easy epidemiological and statistical fashions have obtained greater interest from authorities, and they're famous withinside the media. Due to an excessive degree of uncertainty and shortage of crucial information, popular fashions have proven low accuracy for long-time period prediction. This paper affords a comparative evaluation of gadget getting to know and smooth computing fashions to are expecting the COVID-19 outbreak as an opportunity to SIR (Susceptible, Infected

Recovered) and SEIR (Susceptible, Exposed, Infectious, Recovered) fashions [1].

[2] COVID-19 occurrence forecasting using Supervised Machine Learning Models demonstrates the functionality of Machine Learning fashions to forecast the variety of upcoming sufferers laid low with COVID-19 that's currently taken into consideration as a capability risk to mankind. Three kinds of predictions are made via way of means of each of the fashions, along with the variety of newly inflamed instances, the variety of deaths and recoveries within the subsequent 10 days [2].

[3] Prediction version and chance rankings of ICU ward admitting and mortality index in COVID-19 cope with a retrospective assessment of clinical statistics of geography, laboratory assessments and comorbidities on the preliminary presentation. The number one results had been ICU admission and loss of life. Logistic regression become used to perceive impartial scientific variables predicting the 2 results [3].

[4] Machine-learning prediction of coronavirus disease in India. Makes an easily available device which lets one know ways to expect the type, size, and timeline of COVID-19 instances volume and wind-up length crosswise India. Method outperformed whilst likened to formerly available sensible fashions on the bases of precision of prediction. Hence, installing area the measures of prevention can successfully manipulate the unfold of COVID-19, and additionally, the loss of life price could be decreased and in the end, be over in India and different nations [4].

[5] Modelling and Prediction of the disease with Deep Assessment Methodology and fractional calculus makes a specialty of modelling, predicting, and evaluating confirmed, recovered, and useless instances of COVID-19 via way of means of the use of Fractional Calculus in contrast with different fashions for 8 countries [5].

[6] Development and validation of a gadget getting to know-primarily based prediction version for near-time period in-health centre mortality amongst sufferers with COVID-19. A version is evolved to validate the predictions of near-time period in-health centre mortality amongst sufferers with COVID-19 via way of means of the utility of a gadget getting to know (ML) set of rules on time-series inpatient information from digital fitness statistics [6].

[7] Covid-19 of Portugal province: prediction of hospital admission, ICU and predictions on respiratory-health made on the numerous ranges of a patient's data, namely: pre-hospitalization (checking out time), post-hospitalization, and post-extensive care. The well-timed prediction of the clinical wishes of inflamed people permits a higher and faster care provision for the essential instances, helping the control of to be had resources [7].

III. METHODOLOGY

Datasets are important in the process of selecting the perfect algorithm for the problem. The Random Forest algorithm is used to classify the patient's records. Many Machine Learning techniques can be applied to this problem statement. Machine learning techniques include supervised learning, regression, etc. The appropriate technology that can be used for this problem statement is the supervised machine learning technique. To categorize the problem by input and/or output and to understand the data. Some algorithms can work with small0 sample sets while others require huge amount of samples. After exploring the dataset, the selection of features plays an important role. A computational model will be developed by applying the algorithms that will efficiently detect patient healthcare reports. Several supervised learning algorithms are proposed among which an efficient algorithm is selected which helps us to achieve better accuracy effectively.

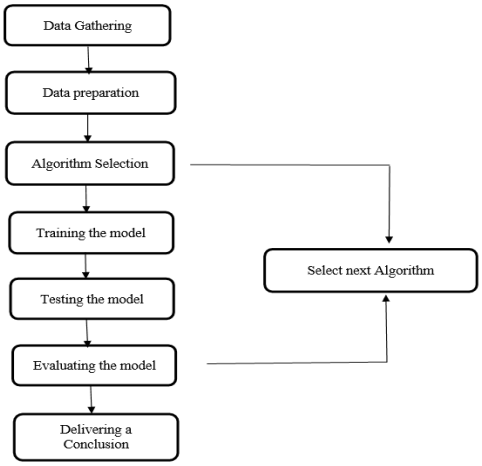


Fig 1.1 System Architecture

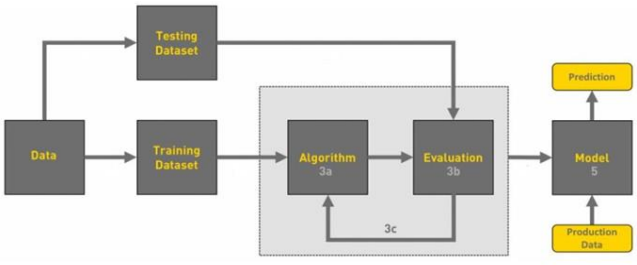


Fig 1.2. Data Flow Diagram

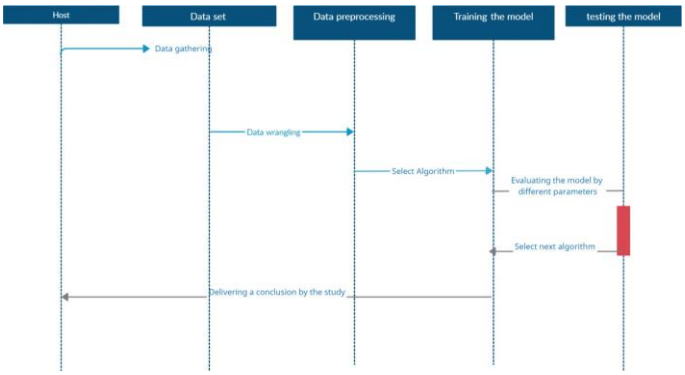


Fig 1.3. Use Case Diagram

. Random Forest (R.F)

R.F are a combination of algorithms for classification, regression etc., that do the job by creating many decision trees at the time of training and giving out the class which Classification or Regression of the individual trees within. Random forests correct from decision trees' property of overfitting to its training data set.

A supervised classification algorithm, the Random Forest algorithm is used to create a forest in some fashion and make it random, as evidenced by its name. The amount of trees in the forest has a direct relationship with the accuracy of the results: the more trees, the more accurate the result. However, it's important to highlight that making the decision with the information gain or gain index approach is not the same as producing the forest.

B. K-Nearest Neighbor

K-Nearest Neighbors is the simplest but critical class of algorithms in Machine Learning. It belongs to the supervised gaining knowledge of the area and unearths excessive utility in sample recognition, information mining and intrusion detection.

It is broadly disposable in real-existence eventualities because it's miles non-parametric, meaning, it does now no longer make any underlying assumptions approximately the distribution of information (in preference to different algorithms including GMM, which expect a Gaussian distribution of the given information).

C. Support Vector Machine

This is a supervised algorithm for gaining knowledge of the set of rules which may be used for types of regression challenges. However, it's far mainly utilized in type problems. In the SVM set of rules, we plot every information object as a factor in n-dimensional Space(wherein ‘n’ is the variety of capabilities) with the price of every characteristic being the price of a specific point. Then, we carry out type via way of means of locating the hyper-plane that separates the 2 instructions very well (examine the beneath image).

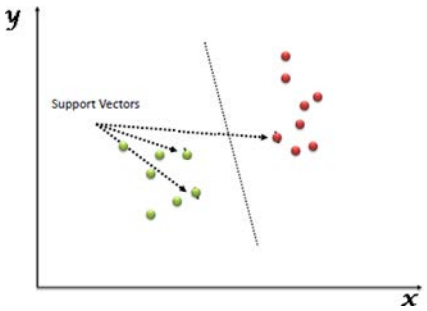


Fig 2. Support Vector Classifier scatter plot

Support Vectors are the points of a person's observation. The SVM classifier is a partition that separates the 2 instructions (hyper-plane/ line).

D. Decision Tree

The Decision Tree belongs to supervised algorithms. Unlike different supervised algorithms, it is used for fixing regression and category issues too.

The purpose of the usage of a Decision Tree is to create a version which can be used to expect the elegance or cost of the goal variable via means of studying easy choice regulations taken from previous data (educational data).

For predicting a category label for a document, we begin from the foundation of the tree. We examine the values of the foundation characteristic with the document's characteristics. On the premise of comparison, we observe the department like that cost and bounce to the following node.

E. Linear regression

Linear regression is more straightforward to apply and analyze, as well as to train. Overfitting is a common issue with linear regression; however, it may be readily prevented by making use of dimensionality reduction techniques and regularization techniques along with cross-validation.

IV. LIMITATIONS

A. Random Forest

It's good at classification but not so much at regression because it can't forecast continuous nature well. Regression does not forecast beyond the range of the training data, and it is possible to overfit, especially for noisy data sets.

B. K Nearest Neighbour

This algorithm works well only with data not having large datasets and many dimensions. Feature scaling is required before applying the KNN algorithm or else it might generate wrong predictions. It is sensitive to noisy data, missing values, and outliers.

C. Linear Regression

This is liable to overfitting but can be prevented by using dimensionality reduction. The main limitation is that it assumes linearity for the dependent variable and the independent variable. It is also prone to multicollinearity because it thinks there is no relation among independent variables.

V. TESTING

A. Exploratory data analysis

The graph below shows the different severity of the patients in the data set.

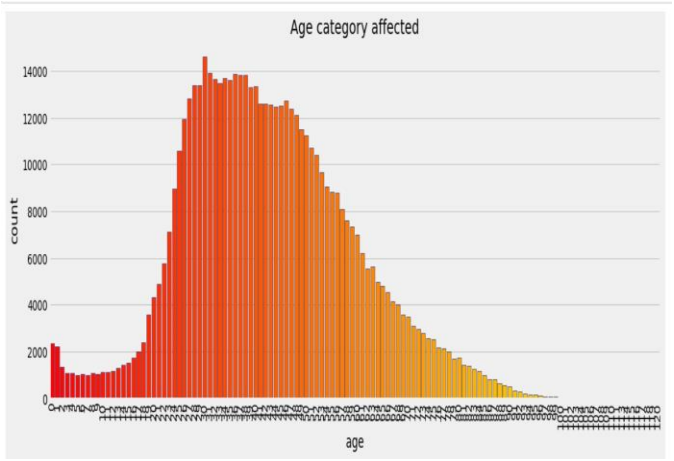


Fig 3.1 Severity of the patients w.r.t Age

The graph below shows the different sex of the patients in the data set

```
y = cr.sex.value_counts()
sns.barplot(y.index, y.values)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x184dfec3888>
```

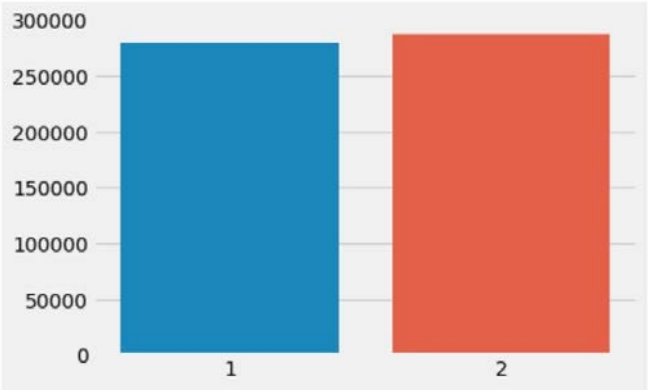


Fig 3.2 Bar plot on basis of the sex of the patients

The graph below shows the different severity of the patients in the data set

```
y = cr.icu.value_counts()
sns.barplot(y.index, y.values)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x184e40c39c8>
```

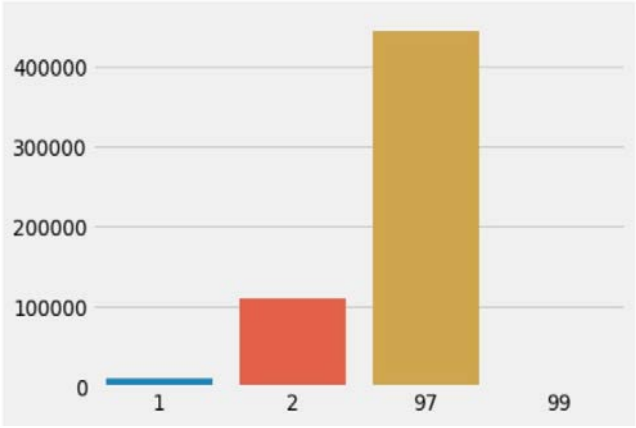


Fig 3.3 Different severity of patients

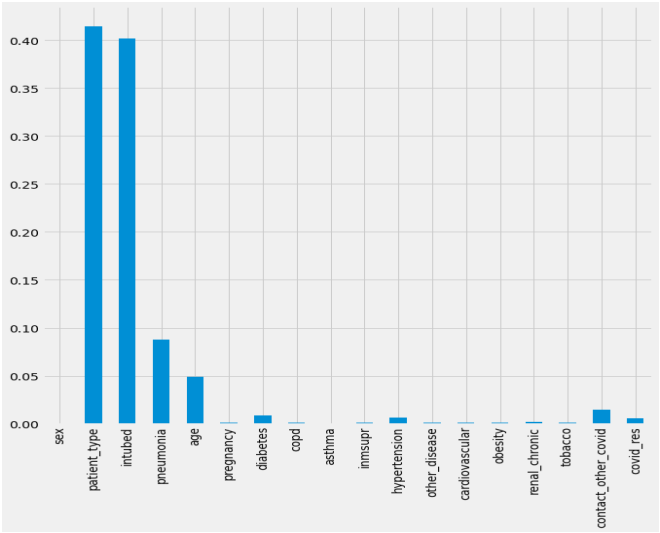


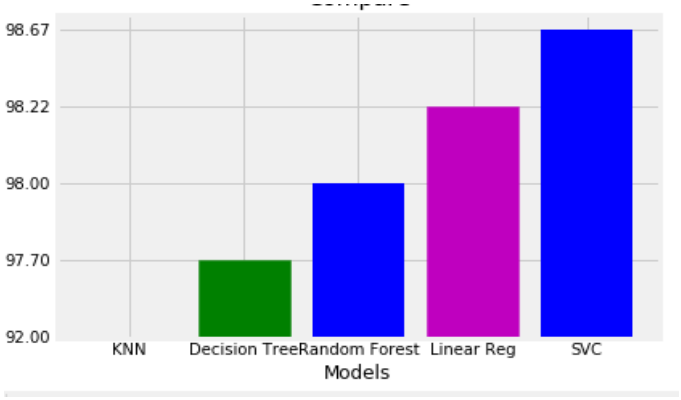
Fig 3.4 Feature importance from the classifier

1. RESULTS AND DISCUSSION

Algorithm	Accuracy
Random Forest	98.13
KNN	92.00
Linear Regression	98.82
Decision Tree Classifier	97.70
Support Vector Classifier	98.7

As it can be viewed in the above table, SVC scored the highest accuracy and KNN scored the least.

Fig 4.1 Results of test sets



VII. CONCLUSION

The proposed model is data-dependent and is subject to modification in the covid 19 virus. The model will be needing new data to understand patients accurately. The data set needs to be large with more features to play with so that we are sure it performs accurately. This model can be deployed with real-time data and used by doctors to classify the patients at the beginning. The model can be modified for other risk predictions of another disease.

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Marts And Mall Customer Based Segmentation Using Regression and Clustering Techniques.

Vamshi S[1, a)],Priyadarshini[1, b)] Vudagandla VinayKumar[1, c)], Thavva Mohith Ruthviz[1, d)], Vivek Vardhan Reddy[1, e)]
[1]*Department of Computer Science and Engineering, REVA University ,Bangalore – 560 064, Karnataka, India*

***Abstract*— In this analysis, we'll explore a data set on mall visitors to notice similarities or patterns. This analysis is useful in understanding the demographic and psychographic sub-populations in the business field or market field. This helps in the methodology of user persons: This is beneficial in collecting data and gather more data to build a data set that has more features. Because of the more transaction rate, maintaining a balance between the customer demand and inventory is the main part for the business .Therefore , making the right prediction and analysis of the given data in-order to increase the profits of the business. Once this is better understood, you could understand what factors will increase spending score, thus leading to greater profits. Many of the existing analysis, predictions of the business only depends upon extrapolating of the statistical trends .This project helps the marketing team and marts and malls to increase their profits in various strategies .As of more columns or more data there is better understanding of the predicting score**

Keywords—target customers, k-means clustering, supervise and unsupervised learning ,clusters, market analysis

I. INTRODUCTION

As of now, Every marts and malls are aware of how to handle data analysis techniques in business strategies. Where they don't know the required knowledge and requirements to analysis. In this paper, we present the use of data analysis techniques in sales-consumers business intelligence for marts and malls business .This prediction serves mainly to assist marketers to know more about their customers so that they can build their marketing strategies more successfully. Based on the machine learning regression models and statistical models, consumers of the marts and malls are divided into different meaningful clusters, where these clusters are divided using the k-means clustering algorithm. The important characteristics of the customers in every cluster it is clearly identified. A set of guides are given to the technician in sales-consumers marketing. Management and maintenance of customer relationships have always played a vital role in providing Organizations to create, manage, and develop valuable long-term customer relationships. The importance of handling customers as an organization's purpose is increasing in value in the day to . Organizations have an interest in investing in the development of customer acquisition, maintenance, and development strategies. Business intelligence has a Technical knowledge can be used to improve customer service. knowledge and programmes for outreach. Customers can benefit from clustering techniques such as k-means. Those with same means are grouped together. This assist the business strategy team to analyzing various customer segments. Purchasing strategies helps in finding out the customers who differ in In terms of preferences, expectations, desires .The primary goal of this Customer segmentation is to group people who have similar interests so that the marketing team can be combined into an effective marketing plan.

II. KEY FEATURES /OBJECTIVES

1. The objectives of this work is two fold, i.e.,

A. The main goal of this project is to create an Marts and mall customer based Segmentation analysis using open-source technologies.

B. Making predictions and analysis on the customer data, where marketing teams makes use of it to raise the profits and branding name of the marts and malls and also increase their customers. Which helps to increase their revenue by making use of the predictions and analysis.

C. From analysis and predictions, not only marts and malls can benefit but also indirectly consumers or customers can also be benefited.

III. Literature Review

Organizations have evolved over time as a result of intense competition in the economic world. They want to increase their earnings and business by meeting client requests and attracting new ones. Consumers based on their requirements Customers must be identified and their needs must be met. Each consumer is a challenging task. This is due to the fact that clients can differ based on their preferences. Their needs, desires, and preferences are not the same as their needs, wants, and preferences. Customers are segmented into groups based on common characteristics. Customer segmentation, according to Wikipedia, is a strategy for splitting a market into distinct groups. All of them are the same. The data is used in an analysis called customer segmentation. [1]segment customers using a variety of variables. The easiest and most common demographic factors include age, gender, family, education level, and income. For segmentation variables in socio-cultural, geographic, psychographic, and behavioural contexts are some of the other major variables employed in segmentation. [2],given a in-depth of the various clustering algorithms grouped under clustering ,density, grid-based, and algorithms , considering the characteristics of Big Data such as size, noise, dimensionality .[3] looked into the importance of client segmentation utilising clustering techniques as a major CRM feature. The pros and disadvantages of the commonly used Hierarchical Clustering algorithms and K-Means clustering were examined. Finally, the thought of developing a hybrid strategy is represented by combining the two strategies above, which has the potential to out perform the different approaches.

[4], Decision makers use many variables to segment customers. Demographic variables such as age, gender, family, education level and income are the easiest and common variables for segmentation. Socio-cultural, geographic, psychographic and behavioural variables
are the other major variables that are used for segmentation.

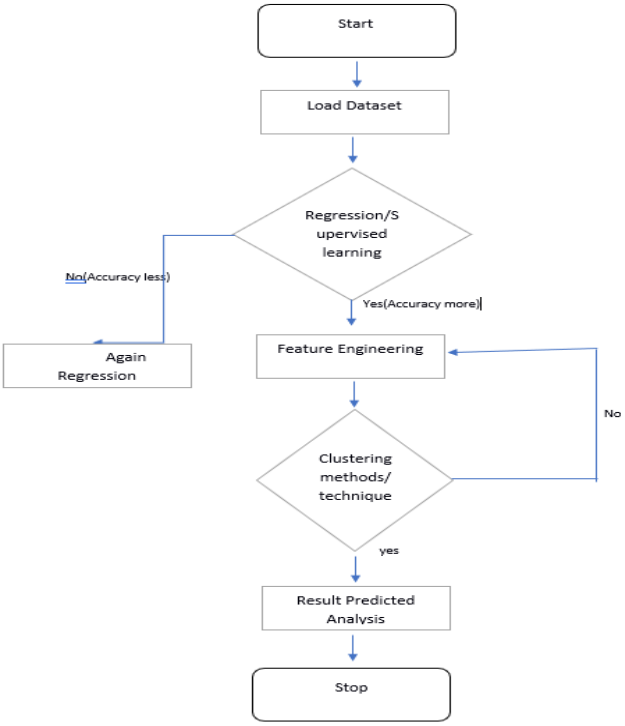
[5], presented various clustering algorithms taking into account the characteristics of Big Data such as size, noise, dimensionality, algorithm calculations, cluster shape and presented a brief overview of the various clustering algorithms grouped under partitioning, hierarchical, density,
grid-based and model-based algorithms.

[6] explored the necessity of segmentation of the customers using clustering algorithms as the core functionality of CRM. The mostly used K-Means and Hierarchical Clustering were studied and the advantages and disadvantages of these techniques were highlighted. At last, the idea of creating

a hybrid approach is addressed by integrating the above two strategies with the potential to surpass the individual designs.

[7], Merged clustering of fuzzy c-means and genetic algorithms to cluster, steel industry customers, by using the LRFM variables (length, recency, frequency, monetary value) system, customers were divided into two clusters

IV. .BLOCK DIAGRAM



A. Data Set

The data set which is used for supervised and Unsupervised learning is in the form of word document and it will be converted into excel sheet and we imported to interpreter using some libraries.

B. Regression / Supervised learning

Using the data which is imported using pandas is used for regressions. In data we use different columns for regression. If the accuracy didn't match, then we will take another columns. We repeat this process until we get best accuracy.

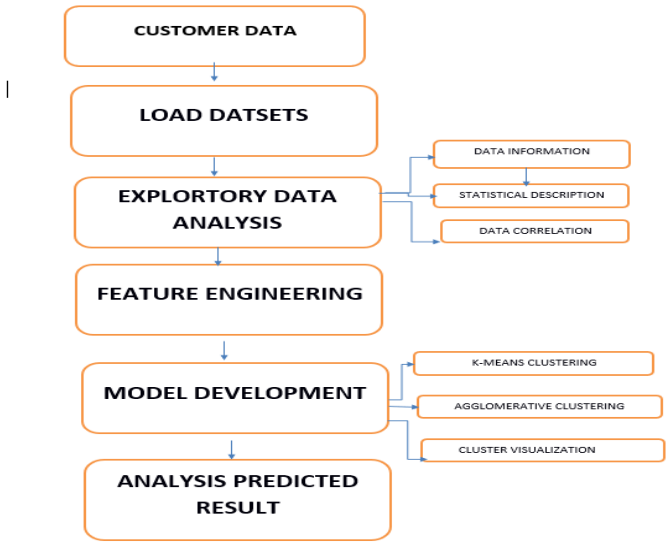
C. Feature Engineering

In this step we remove some unwanted empty columns and empty rows and also we try to insert some predicted answers empty answers. We predict some answers and filled it in the empty answers which requires to clustering techniques.

D. Clustering / Unsupervised Learning.

In clustering, we cluster the data into some different groups based on the similarity of the customers, If clustering is not done in proper way then we wont get our analysis in right way. So ,we repeat this process until the clustering get done in right way.

V. METHODOLOGY AND ALGORITHM



A. System Architecture

The goal of this project is to increase the profits and branding name of the marts and malls, correctly estimate client segmentation. Machine learning models are used in conjunction with conventional methods to improve the accuracy of client segmentation estimates in malls. Various machine learning models are employed**.**

B. Workflow of the system

Step1: Customer data

First step is to collect the customers data through different sources.

Step2: Load Datasets

The data which is collected through different sources are added in excel file and we import to the complier using pandas.

Step3: Exploratory Data Analysis
In this step we use some supervised algorithm to check the accuracy and data corelation. we will do data information and statistical description, then data corelation. If the accuracy is not matched or less, then we repeat the process for different columns.

Step4: Feature Engineering
In this step , we do the process of choosing, changing and transforming the raw data into columns that can be used for supervised learning and unsupervised learning.

Step5: Model Development
In this step , we undergo some clustering techniques like K-means clustering , agglomerative clustering and cluster visualization where we cluster the customer into different groups based on some similarities.

Step6: Analysis Predicted Result
In this step we get to know the prediction analysis of the all steps where it gives the result of the clustering of the clustering of the customers which helps for the marketing team

Clustering:
Clustering is the technique of dividing customers into different groups based on some similarity of the customers data.

C.Algorithms and Models:-
Linear Regression and Logistic regression:-
If the dataset is small or minimal then we can use the linear regression and it is used to find the best fit line that accurately predict the output.
If the dataset is larger then we can use logistic regression for calculating the accuracy. These are the two supervised algorithms are used in this project.
Coming to clustering techniques we used **K-means clustering and agglomerative clustering.**
K-means clustering algorithm determines the best value for k center points and also assigns each data point to its nearest k-center.
Agglomerative clustering algorithm makes most similar clusters together and merge them.

VI. Experimental Results

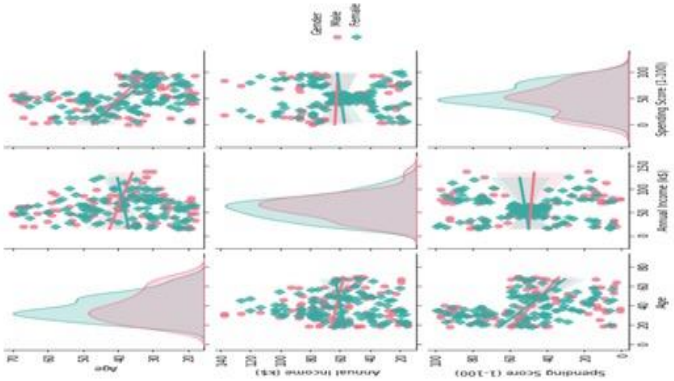
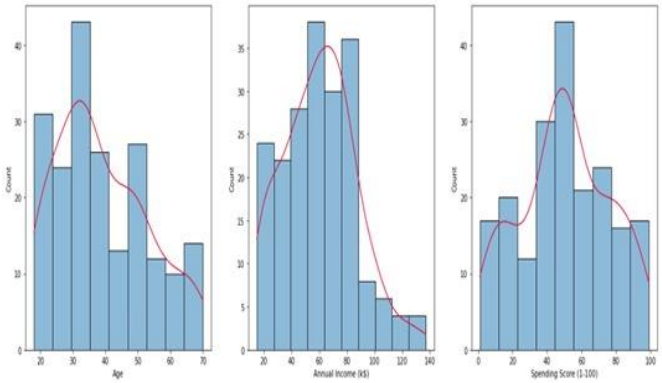


Fig1:- pair plot

From the above pairplot we can see that green colour has highest ratio than pink colour as the there are



more female customers than male .

Fig2:-

From above figure we can see that the distribution of numerical features, discrete features , continuous features and categorical features .

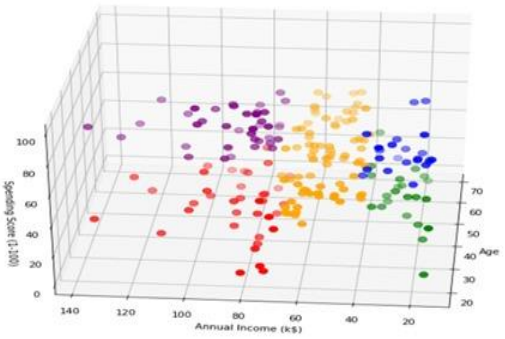


Fig3:-

From the above figure we can see that the customers are divided into five different groups:-

Cluster with red colour indicates that consumers or customers are of low annual income and low spending scores. In this case the marketing team is of low interested in this kind of people.

Cluster with purple colour indicates that customers or consumers are of low annual income and high spending scores . In this case the marketing team are not concentrating more but still they wont lose them.

Cluster with pink colour indicates that customers or consumers have average annual income and spend average spending scores. In this case the marketing team uses some techniques to increase their spending scores.

Cluster with blue colour indicates that customers or consumers having high income and high spending scores. The marketing team uses some techniques to increases the spending scores.

Cluster with green colour indicates that customers with high income but low spending scores. The marketing team try to add new facilities so they can attract these kind of people and meets their needs.

VII. Compliance with the society

Our project is indeed useful to society (Business, People) as our analysis predict the result which can help both the customers as well as business. This analysis can help the market to increase their sales and gain profits. People also get benefit from our analysis in which most buying customers can get product recommends, rewards and so on.

VIII. Conclusion

Merchandisers have constant obstacles in the ever-changing market around. Retailers must recognise the compelling value proposition of a "buyers' market." Consumers have a extended range of purchasing experiences to choose from, but no one can possibly capture them all. As a result, it is up to supervision to define their market prediction and pointing their efforts on solving the problems of that market. Technology, demographics, customer position, and the emergence of a global country are all conspiring to change the game. How careful merchants are about the new values, expectations, and demands of the shopper will determine how successful they are in the twenty-first century. To boost the mall's productivity, this analysis will generate a prediction based on customer segmentation.

IX. FEATURE ENHANCEMENT

This project can be further can be make use for product recommender system which can benefit the customer and also the products by recommending the product to the consumers. By this the revenue of the marts or malls can be increase and also customers to that malls or marts are increased in an continuous way . Customers are benifited with many facilities like getting more discounts, offers…etc.

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Security Tool for Evaluation of Web Applications for Vulnerabilities as listed by OWASP

[1]Vankadara Veera Harshith, [2]Priyadharshini, [3]Tejas R M, [4]Tatireddy Goutham, [5]V S K Anudeep Reddy

Authors affiliation, Department of Computer Science and Engineering, REVA University

Abstract.

Web Application developers in their hurry to deliver the applications quickly could be overlooking the various security vulnerabilities in their application. OWASP has listed vulnerabilities of the web applications This paper has tried to identify possible security breaches in the web applications by developing a comprehensive tool that can detect the infirmities in the web application. The tool is built using python which detects vulnerabilities in the web applications named Quick Scanner. It can detect five vulnerabilities SQL Injection, Cross site scripting, Open redirection, Vulnerable default pages and Local file inclusion vulnerability. This security breaches may lead to leak of sensitive data like usernames, passwords, personal identifiable information, social security number, credit card details, health information etc. This tool takes very less time to scan and generate report on the web application.

Keywords. Vulnerability scanner, SQL Injection, Cross site scripting, local file inclusion, default vulnerable pages, open redirection.

1. INTRODUCTION

Web services are used for increasing various kind of services available from different websites and web-applications which can be accessed from range of devices starting from desktops and laptops to tablets and smartphones. And not to mention about the technological development that we have witnessed in the past few years is quite immense.

According to a survey, there were about 23 million web developers in the US as of the year 2018. During the Covid pandemic, it was observed that there were higher search queries in google regarding how to create or design a web application. Though the applications are developed by individual or web developers, these applications are not designed to take care of various security threats that may be incurred on the data and systems during various stages of the network transaction

A report in 2019, found that security breaches had increased by 67% over the last five years. Similarly, a survey as of 2020, the average cost a data breach is $3.86 million and the average time to identify a breach was 207 days (sources from IBM) and we might be thinking or assuming that our systems are secured and defended by firewalls and antivirus software's. But the fact is that 73% of black hat hackers have stated that the traditional firewalls and antivirus security systems are irrelevant or obsolete.

Many new variants of vulnerabilities are discovered every day, and OWASP (Open Web Application Security Project) lists top 10 vulnerabilities every 3-4 years, just to mention a few vulnerabilities like Cross-Site Scripting (XSS), Injection (such as SQL, NoSQL, OS, and LDAP), Broken Authentication, Local File Inclusion [LFI], etc. Measures to protect web application from these attacks. But to build the web application that is robust, reliable in spite of hostile web environment there is a need to carry out or perform penetration testing and find out vulnerabilities. It is a useful tool for web developer as well as the consumer of services of the web application. There are few tools that could be put to service but are costly and may not be available to all developers. They are a few that consume lot of memory resources, while some are manual or automated. With the wide range and ease of usage of libraries in python, we have designed this automated tool that is optimized in terms of memory resources consumed and execution time.

2. AUTOMATED AND MANUAL TESTING

Manual testing is testing of software where the test is carried out by professionals manually. It consumes more time compared to automatic testing. Efficacy of manual testing is more compared to automatic, as the scope of the automatic testing is limited within the vulnerabilities defined by the developer. In this process, the tester carries out different test cases and generate report manually without the help of any automatic devices. Manual testing is preferred in case of more complex applications.

Automatic testing is testing of software where the test is carried out automatically by automatic tools. The main goal of automated testing is to reduce the time consumption. The tool performs different test cases and generates report automatically. Automated testing is preferred in case of simple applications.

3. METHODOLOGY

The Quick Scanner tool developed will accept URL and cookie as input. The tool checks the system has stable internet connection and verifies if the URL and cookie entered is valid. Scanner will collect all the information about the target like server type, connection, and content type. It will crawl over the target site and find all the links linked to the target so that vulnerability testing can be performed on web sites linked to target. Later the target is further processed for vulnerability detection and user can choose specific vulnerability to perform the vulnerability detection and generate report. As shown in Figure 1. The tool is implemented using different module that is Scanner module, Attack module which contains vulnerabilities and Report generation.

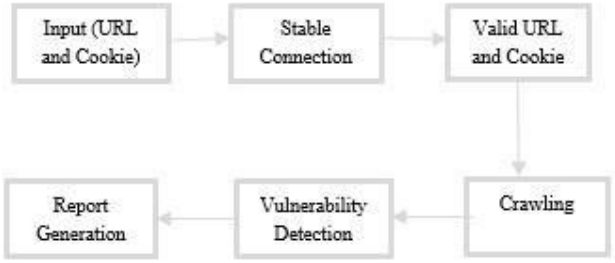

FIGURE 1. Implementation Details

3.1. Scanner

In the scanning process Quick scanner will accept URL and cookie as input. Checks if the system has stable internet connection and verifies if the URL and cookie entered is valid or not. Scanner will find all the information about the target like server type, connection, and content type. It will crawl over the target site and find all the links linked to the target so that vulnerability testing can be performed on sites linked to target. Later the target is further processed for vulnerability detection and user can choose specific vulnerability to perform the vulnerability detection.

3.2. SQL Injection

SQL Injection is also known as 'SQLI', this is one of the top 10 OWASP vulnerabilities. This uses malicious SQL to access the sensitive data like passwords, usernames, etc. which are stored in the database and not supposed to be displayed in frontend.

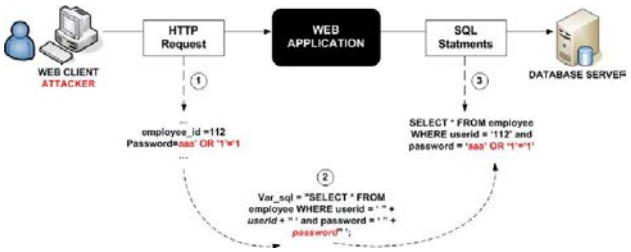

Figure.2 Diagrammatic Representation of SQL Injection

3.2.1. SQL Injection Problems

The main cause for SQLI is many web application developers do not apply validation for inputs and they are not aware about consequences that may arise due to that. So, this is nothing but welcoming the attackers to access the sensitive data from the database by executing malicious SQL commands. The most advantage to attacker here is easy to implement and disadvantage to developer is difficult to avoid like these injections.

3.2.2. SQL Injection Scanner

Here we define “scan_ sql_injection ()” for detecting SQL injection. Here we give the respective URL and dictionary of cookies as input. First URL will be parsed for getting query, then by using requests. Get () function we will get the result, then by using function “is vulnerable ()” whether vulnerability present or not, this function checks for errors like ‘errors in SQL syntax’, ’warning: MySQL’, ‘unclosed quotation mark after the character string’, ‘quoted string not properly terminated’, 'Error: You have an error in your SQL syntax. In this step we check any vulnerability is present in the URL or not.

After URL is verified, we will fetch all the forms from the URLs by using “get_all_forms ()”. Now we will find the details such as form method, input type, name, buttons, text area and option of each form. Now again as mentioned above by using “is vulnerable ()” we will check vulnerability in all the web pages.

3.2.3. SQL Injection Prevention

- Authenticate user inputs
- Restrict special characters from input fields
- Enforce prepared statements and parameterization
- Use stored procedures in the database
- Raise Virtual or Physical firewalls
- Use whitelists, not blacklists
- Establish appropriate privileges and strict access

3.3. Cross Site Scripting (XSS)

Cross site scripting is one of the top 10 OWASP vulnerability found in web applications. Cross site scripting will allow users to inject scripts from client side into web pages which are viewed by the other users. The users will trust the script and execute the script. The script sent by the attacker can access any cookies, sensitive data, and session cookies of the used user on that particular site.

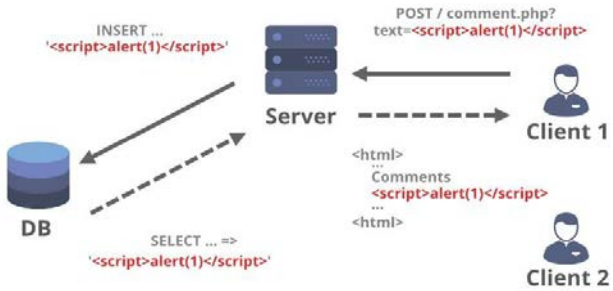

Figure.3 Diagrammatic Representation of Cross Site Scripting

3.3.1. Cross site scripting problems

Cross site scripting mainly occurs at the arrival of input, in response headers and in content security policy. The proper input validation as to be done and filter the input based on the requirement. The output data should be encoded to prevent active interactions of the

attackers. We should use Content-Type and X-Content-Type-Options headers to prevent XSS in headers. And can use Content security policy as the last line security in web applications.

3.3.2. Cross site scripting scanner

Here we have defined "scan_xss()'' function which takes header and URL has the parameter. The function checks if cross site scripting vulnerability exists in that URL. First, we get all the forms used in the website using the function "get_all_forms()'' and pass header and URL as parameter. In this function we get forms used on the website using beautiful soup library in python and get all the input details like type and name. And store the details of action, method, and inputs separately in a list. The list of payloads will be made based on JavaScript that can be used for the cross-site scripting exploitation. We read each line from the payload file and submit that payload in the input of the form using the "submit form ()'' function. In the "submit form ()'' function we pass "form details ()'', URL, payload, and headers as parameters. Based on the method of form (post or get) we send the request to the URL using the payload sent to the form and store the response from the server. Based on the response we define if vulnerability exists in that URL. Similarly same process is continued for all the payloads present in the list. If vulnerability exists, the response would be 200 OK and the pop-up message would be displayed as mentioned in the script else the response will be 404 error which implies there is no XSS vulnerability.

3.3.3. Cross site scripting prevention

- Filter inputs on arrival.
- HTML encode before placing Untrusted data into HTML element content.
- Use suitable response headers.
- Use HTTP Only cookie flag.
- Evaluate content security policy

3.4. Open Redirection

Open redirection vulnerability is found in web applications which incorporates user data into the application about the user. An attacker can make users redirect to external domain by developing a URL within the web application. And hence the attacker gets the sensitive data about the user like email, password, and other personal information. So, we should not allow the user to the redirect page of the application.

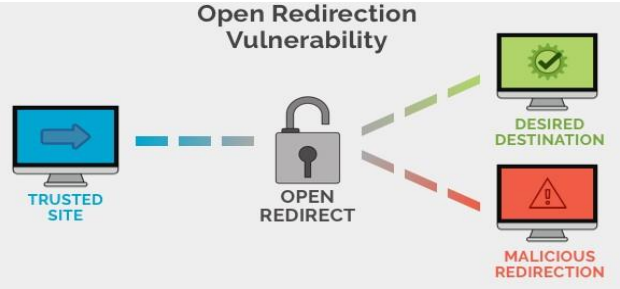

Figure.4 Diagrammatic Representation of Open Redirection

3.4.1. Open redirection Problem

Open redirection vulnerability exists when the application redirects the user entered data form to the other page. We should use an ID internally in the code to the respective URL so that page does not redirect to the other URL or domain specified by the attacker. The user should validate whether the URL starts with http:// or https// and invalidate all other URLs other than http:// and https://. The other method is to use the server-side URLs to list them all and permit only listed URLs to redirect.

3.4.2. Open Redirection Scanner

Here we have defined "scan ()'' function which takes URL and header(cookie) as parameter. We will also have a list of payloads which contains the redirection extension for the URL. From the payload file we read a single line of payload and add the payload to the URL. Later we send request for each URL with different payload and store the response. If the response contains 404 status code (i.e., Page not found) which implies the page does not redirect to the other page for that payload and hence we check for the vulnerability for other URLs. If response contains the status code 301(Permanently redirect status response) or 302(the resource requested has been temporarily redirected to the URL) which implies that the application is redirecting to the other page without user's knowledge. This states that the web application as the Open redirection vulnerability. We store the data about the URL and payload for which redirection exits and report it in the final step for the developer about their web application.

3.4.3. Open Redirection Prevention

- Block offsite redirects.
- Validate the referrer when doing redirects.
- Do not allow the URL as user input for the destination
- Filter input by creating a list of trusted URLs (list of hosts or a regex).
- Force all redirects to first go through a page notifying users.

3.5. Local File Inclusion Vulnerability

Local file inclusion is one of the top OWASP vulnerability found in web applications. It is a technique where attackers make users to run or expose files on a web server. It leads to exposure of sensitive data and in some cases, it leads to cross-site scripting vulnerability. It mainly occurs when the application takes any type of files or images as input.

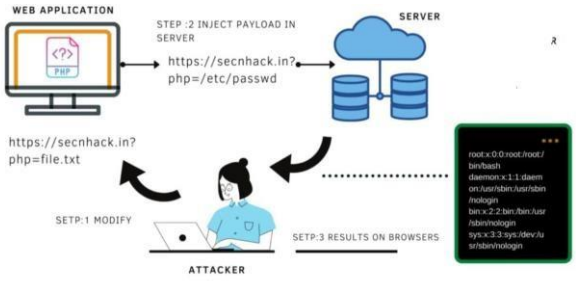

Figure.5 Diagrammatic Representation of Local File Inclusion Vulnerability

3.5.1. Local file inclusion problem

Local file inclusion vulnerability occurs when the application takes files or images as input. This provides the attacker to inject their own scripted code into the application and exploit it. The web application developer should use IDs to save their file paths in the secure database and use ID for different files. Can also use whitelisting method where the only verified and secured files should be used, and the remaining files must be rejected. The file upload must not be uploaded on the web server instead a separate database must be used to store the files uploaded by the user. The paths passed should be properly sanitized. This vulnerability will also lead to exposure of passwords if stored locally in the application.

3.5.2. Local file Inclusion Scanner

Here we have defined “main ()’’ function to check for local file inclusion scanner and pass URL and header (Cookie) as the parameter. First, we check for the PHP filter using function “test_php_filter ()’’ passing same parameter to this function. Based on the test cases for the PHP filter we assign the payload for the URL and send the request to that address using the request function and store the response we get. Then we filter the response using “checkPayload ()’’ function and if we get any Keyword as defined in the list then return true. Hence it states that local file inclusion vulnerability exists in that application. Next, we check for the PHP data only if there is no vulnerability in PHP filter. In PHP data we call the function “php_data ()’’ function by passing URL and header as parameter. Like “php_filter ()’’ case we define a payload that is related to the PHP data and add the payload to the URL and send the requests. Then we check response using the “checkPayload ()’’ function and state if the application as local file inclusion vulnerability or not. Then check for the PHP except where we pass same parameters and like the PHP data and filter functions, we again add payload, send request and check the response. If all the three cases fail, then we check for the wordlist using the function “test wordlist ()’’.

Same process is used in this function as above three functions and response are stored. If all the four cases fail which implies there is no local file inclusion vulnerability in that application.

3.5.3. Local file Inclusion Prevention

- Never trust user input.
- Use a whitelist of allowed file names and locations.
- Make sure that none of the file can be replaced by the attacker using file upload functions.
- Do not include file on a web server that can be compromised, use a separate database instead.

3.6. Vulnerable Default Pages Vulnerability

Vulnerable default pages [12] are a security misconfiguration vulnerability. This attack is found in web applications with default settings and pages which leads to misconfiguration. Consequences of this vulnerability is it leads to sensitive data disclosure and the attacker may even change the user's data in the application.

3.6.1. Vulnerable default pages problem

The important way to prevent vulnerable default page vulnerability is to disable the use of default accounts, passwords, and pages in the applications. The application must be scanned regularly to detect any misconfiguration is present in it. The developer must also disable the administrative interfaces and debugging option in the application. The server configuration must be done to prevent unauthorized access and directory listings.

3.6.2. Vulnerable default pages scanner

Here we have defined vulnerable pages function to detect the vulnerability. The function takes URL and headers as arguments. We have a list of payloads and add the payload to URL and send it to test function. Later we send the request of the URL with payload and check the response. If the status code is 200 which means the default page vulnerability is present else there is no default vulnerable page vulnerability in the application.

3.6.3. Vulnerable default pages Prevention

- Keep the software up to date.
- Disable all the default accounts and change passwords regularly.
- Develop strong app architecture and encrypt data which has sensitive information.
- Make sure that the security settings in the framework and libraries are set to secured values.
- Perform regular audits and run tools to identify the holes in the system.

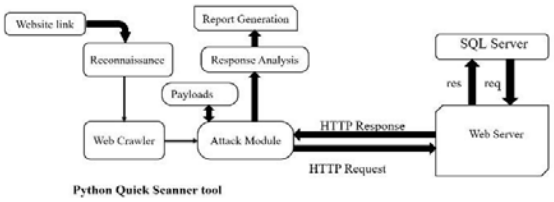

Figure.6 Low Level Design of the Quick scanner tool

4. MODULES IMPLEMENTED

1. Vulnerability Module - This module contains the code of for probing all short coming of the website. Code for testing of vulnerabilities like SQL injection, cross site scripting, open redirection, local file inclusion and default vulnerabilities.
2. Payload Module - It contains the list of payloads required for detecting vulnerability. Example for cross site scripting it contains all scripts for checking if there is any vulnerability.
3. Main Module - It provides user interface; it takes URL and cookie as input and proceed for the vulnerability detection and finally produce report based on the vulnerabilities detected.
4. Python Library - It contains the list of python modules required for the execution of the scanner.
5. Report Generation – Module stores all the data obtained during detection process and at last it generates the report about each vulnerability.

5. EXPERIMENTAL RESULTS

The Quick Scanner tool prompts to generate report after scanning. The report is generated in pdf format. It contains four main tables in the report (Figure 14 and Figure 15) as follows:

1. Summary of Alerts - This table contains two columns ‘Risk Level’ and ‘Number of Vulnerabilities’. Risk level indicates how many vulnerabilities are present and how much risk they are high, medium, low and information to the website. Number of vulnerabilities contains count of them with respect to the risk level. As shown in figure 14.
2. Vulnerabilities Count - This table contains two columns ‘Vulnerability Name’ and ‘Count’.
   Vulnerability name contains all the vulnerabilities like SQL injection, Cross site injection, Local File inclusion etc which are scanned by QS tool. Count contains the number of vulnerabilities present in a website with respect to the vulnerability name. As shown in figure 14.
3. Server Information - This table contains the server information connection type

and content type related to that website and target link will be highlighted here. As shown in figure 15.

4. More Information - This table contains links to the target web pages, local photos and internet photos identified inside the target. As shown in figure 15.

After all these details the report contains alert details, here tables will be differentiated with three different colours red, orange, and yellow. Red indicates that vulnerability's level of risk is high, orange indicates that vulnerability's level of risk is medium and yellow indicates that vulnerability's level of risk is low.

Here each table contains description related to that vulnerability, URL of the particular web page, method, attack parameters, some prevention methods which should be considered by the web developers to protect their website from particular vulnerability and finally the table contains references links through which developers can get some information related to that particular vulnerability as follows.

1. Target URLs – This page contains various web pages that are found while spidering and crawling.
2. Local Images - This page contains links of the local images found inside the target URL.
3. Internet Images – This page contains links of the internet images found inside the target URL.

6. COMPARATIVE STUDY

This module is about the differences between proposed tool and existing tools. The main advantage of our tool is less time complexity, less space complexity and consumes very less RAM for execution. When we compare our tool with Nessus, it takes more time, consumes lot of RAM and also more data is stored. Wapiti is the vulnerability scanner which scans only the URL specified but our tool will scan for all web-links or URLs linked to given target.

For comparative study purposes we developed a website and hosted in the localhost as well as containerized and hosted in docker to perform isolated or sandbox testing. We tested the website developed for vulnerability scanning with Nessus tool and with our tool Quick Scanner. Both tools detected vulnerabilities in the websites, but Nessus took more time compared to Quick Scanner.

7. CONCLUSION

Security issues related to web-application is evolving always. Building and deploying web application seems to be easy, but web application needs to be developed with lot considerations to the security issues involving different stake holders. Whereas major responsibility lies in maintaining and securing the application from being attacked and losing user information or data. In secure web application may be security risk for the host as well as the consumer of its services due to loss of personal data. Every day new

technologies pose new challenges and risk and the tools to check the vulnerabilities need to be constantly upgraded.

8. FUTURE WORK

This study can further be enhanced and pave ways for future development through these possible ways:

- Could use information gathering techniques to gather information from the web about the latest threats and vulnerabilities, which could be useful for developers.
- Build or design a compiler not just to find and debug errors, but also to warn a developer or user, signs of weak practices or loose ends, to safeguard while developing an application.
- Work upon scanning for vulnerabilities, other than the ones which are defined in this study work

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FACE MASK DETECTIONS USING DEEP LEARNING TECHNIQUES

Prof NagashreeN[1]

Ambika A Bhosale[2]

BhagyashriYalawar[3]

Leela K[4]

Navita[5]

School of CSE,REVAUniversity,Bangalore,India

nagashree.n@reva.edu.in

r19cs808@cit.reva.edu..in

r19cs810@cit.reva.edu.in

r19cs821@cit.reva.edu.in

r19cs829@cit.reva.edu.in

Abstract:

Throughout this COVID-19,information formula possess happened castigatory protecting municipality effective, with reality extensive enduring collision appealing information in many places come about further on pandemic.So our research is to help the society by detecting the people wearing maskornot.Our project accuracy up to 95%with mask and 94%with outmask.Using CNN model detect person with mask and without mask.

1. Introduction:

There was a wide range of symtoms.In this situation all of us need to wear mask. People should get aware of wearing mask to control this COVID-19.Wearing mask reduce the affect the COVID-19.The World Health Organizantion as ask the people to wear a medical mask to prevent from Covid-19.

Methodology:

- Dataset,
  - The data will first preprocess and then understand the dataset.
  - Now, the preprocessed will get divided for training and testing the data.
  - Used CNN technologies

- Model is trained well and once the completion of it testing is also done.

- Model trained is tested using the dataset and calculated the accuracy

- Algorithm that gives the good accuracy is taken for prediction..

- After the prediction model is finalized and saved.

- now with the image and video it detect people wearing mask and not wearing mask.

A. Data Processing

In data processing we convert the info into more format and try to achieve the required format very neccerarly.The data's can be in any different form like images,videos,tables,graphs,etc.Our model in trained under the kears and MobileNetV2 to deal with the image and video's.

B Data visualization:

In visual we take data set for better understanding The no of image in the dataset is used for with masks and without masks .Then to have we shall proper view of dataset and useful for commucation of knowledge for encoding. Now the directory looks like("with and without mask").We call it has a format=list.dir(path).To get the format, now need to do formatting like=[k for kin range(ken(formatting))].The format is set to[0,1].Then the format is matched withticd=ticd(formatting, format)).Finally ticd the formate are hwithmask::0 ,with out mask::1p.[12]

C RGB to Gray:

Here we convert out RGB image into gray image so the system uderstand the dataset clear.Once the images are convert then the trained data will be increased in size to get the actions .Now using NetV2 as key to image will be given for space colors.

D DataSet:

We have 2 Data sets that is been used in our model. In data set-1 has 1200 image in the 600 image person wearing mask and other 600 person with wearing a mask. In dataset1 many faces are facing to words the front side and all the person in image wearing same color of mask.

In data set two has 800 image with person wearing mask and without person wearing mask and in data set two few faces are in turned positions with many colors of mask and types of it.

RESULT :

Model tested and trainedontwodatasettotal

accuracyofdataset1is95%, dataset 2 as more faces and various type of mask with different colors so the total accuracy is 94% on dataset 2.From the dataset the images will be taken for the process and prediction of person wearing mask are notwearingmaskalsoitpredictsis is easy as the dataset is trained with different color and types of masks.

LITERATURE SURVEY:

proposed system:

1.This framework is fit to prepare the dataset of the two people wearing veils and without wearing covers.

2.After preparation the model the framework can foreseeing regardless of whether the individual is wearing the veil.

Existing system:

A Multi-Task Cascaded Convolutional Neural Network was utilized to settle the face identification challenge (MTCNN). The Google Face Net installing model is then used to extricate facial elements. This method can prepare a dataset of the two individuals wearing veils and the people who aren't wearing covers. The framework can guess whether the individual is wearing the cover in the wake of preparing the model.

PROBLEM DEFINITION:

The issue here is to anticipate individuals wearing covers or not wearing them, by some picture or video. It is an item recognition and order issue with two unique classes (with veil and without mask). There are various strategies for object location however, for this we have chosen to involve MobileNetV2 as it is straightforward quick and one of the most reliable strategy out there.

OBJECTIVES:

- Discovery of facemask from webcam.
- Recognizing regardless of whether individual weared cover, Mask not weared then blare sound will deliver

TENSORFLOW FRAMEWORK:

Tensor stream is an open-source programming library. Tensor stream was at first advanced by researchers and architects. It is an open-source framework to run significant learning and other quantifiable and insightful examination obligations. A python library maintains various game plan and backslide estimations and even more all-around significant learning. Tensor Flow is a free and open-source programming library for dataflow and differentiable programming across an extent of tasks.. It is used for both assessment and creation at Google, Tensor Flow is Google Brain's second-age structure. Tensor Flow is available on 64-cycle Linux, macOS, Windows, and versatile enrolling stages including Android and iOS. Its versatile plan thinks about the basic course of action of estimation across an arrangement of stages (CPUs, GPUs, TPUs), and from workspaces to lots of

servers to adaptable and edge devices. The name Tensor Flow gets from the assignments that such mind networks perform on complex data bunches, which are suggested as tensors.

KERAS:

KERAS is an API expected for people, not machines. Kera's follows best practices for decreasing mental weight: it offers solid and fundamental APIs, it restricts the amount of client exercises expected for ordinary use cases, and it gives clear and vital slip-up messages. Kera's contains different executions of regularly used mind network building squares, for instance, layers, objectives, order limits, enhancers, and a huge gathering of instruments to make working with picture. The code is worked with on GitHub, and neighborhood social events consolidate the GitHub issues page, and a Slack channel. …

DEEP LEARNING:

Critical learning techniques target gaining highlight mentioned developments with highlights from extra gigantic levels of the solicitation illustrated by the synthesis of lower-level parts. Ordinarily learning highlights at different degrees of reflection permit a framework to learn complex cutoff points orchestrating the obli…

CONVOLUTION NEURAL NETWORK:

A convolution cerebrum network is a remarkable plan of phony mind network proposed by yannlecun in 1988. One of the most notable purposes of the designing is picture request. CNNs have wide applications in picture and video affirmation, recommender structures and normal language dealing with. In this article, the model that this adventure will take is associated with Computer Vision. CNNs, as cerebrum associations, are contained neurons with learnable burdens and tendencies. Each neuron gets a couple of information sources, takes a weighted absolute over them, go it through an order work and replies with an outcome. The whole association has a disaster limit …

CONCLUSION:

As the innovation are blossoming with arising patterns the accessibility so we have facial covering indicator which might potentially add to general medical services office. The engineering comprises of MobileNetV2 classifier as the spine it tends to be utilized for high and low calculation situations. Our facial covering discovery is prepared on model, and weare utilized OpenCV, Tensor Flow, Kera's and python to distinguish regardless of whether individual is wearing a veil. The model was tried with picture and ongoing video transfer. The precision of model is accomplished and, the streamlining of the model is nonstop cycle.

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Online Proctoring Tool For Class and Exam

Bhavatarini N
Assistant Professor, School of CSE,
Reva University,
Bangalore, India
bhavatarini.n@reva.edu.in

Sudeep B D
Student, School of CSE,
Reva University,
Bangalore, India
Sudeepbd01@gmail.com

Shashank GK
Student, School of CSE,
Reva University,
Bangalore, India
shashankgk78@gmail.com

Kumar Abhishek
Student, School of CSE
Reva University,
Bangalore, India
krabhishek277@gmail.com

Suhas Nukala
Student, School of CSE,
Reva University,
Bangalore, India
Suhasnukala2005@gmail.com

Abstract:

Universities shuttered as a result of the epidemic, which had an important influence on higher education. It has affected individuals of all identities, instructive stages, and pay stages .Due to the constant pandemic for the last two years, all the schools and colleges, and institutions have started to take classes remotely via virtual meetings. Universities will have to re-visualize their educational nature in order to stay relevant, with making digital expanding and balancing student-teacher and other connections. Notwithstanding the way that advanced education establishments were anxious to substitute eye to eye addresses with internet learning, these terminations affected learning, tests, and safety. Even though technology is improved within a short span of time, online learning has its own disadvantages and tampering. Educational institutions require a solution that does not jeopardise educators' and students' experience, convenience, or practicality. The human delegate would be supported following along on the understudy's exercises by our program. One camera and a microphone are included in the system hardware for monitoring the visual and audio environment. As a result, anytime a student is accused of committing a mistake, the teachers are provided with notifications about the student's activities, like; eyes moving, using phone, drowsiness tracking. So, when teachers get this information, they might take action as needed. AI-controlled remote proctoring has the prospective to revolutionise the instituions, universitie,collegess by permitting all that to be done electronically. AI-empowered computers frameworks can protect the test's uprightness by preventing applicants from cheating or utilizing out of line methods during the assessment.

Keywords— Proctoring, online classes, face detection, dashboard

I. INTRODUCTION

Virtual classrooms provide various challenges for lecturers and teachers. Faculty members are oblivious of what is going on with students when they are learning online. We've seen a lot of occasions where kids leave their computers and walk outside, or use their phones or communicate with pals. There isn't much interaction amongst the kids. Teachers have little knowledge of their students' activities and feel as though they are lecturing to a screen. Without seeing the pupils' faces, teachers must instruct them. When we are teaching in a physical classroom, we may tell by their facial expressions if we need to repeat the

idea for better understanding or whether we can go on. Not just them, but also students, encounter several challenges. The mentalities of the pupils in a class are diverse. A student who grasps things well, a student who grasps things poorly, a student who is not attentive, a student who has many doubts, a student who is mischievous, and so on. However, because an online class is less participatory, students are more hesitant to ask questions and simply go on. This will cause a slew of issues in the future, as students will feel compelled to ignore any facts or ask professors any questions they cheval. One of the biggest issues is this. Interaction between students and teachers is crucial during educating. Our tool assists teachers in learning about their pupils' current situation. For example, whether or not the students are paying attention, whether or not they are using their phones, whether or not they are drowsy or sleeping, and whether or not they have kept the device static only for attendance purposes. Our programme will notify the teacher if more than half of the students are not interested in the topic, allowing the teacher to create a pop quiz, a fun topic to discuss, or other interactive sessions. If the professors have knowledge or status about the pupils, this is conceivable; otherwise, the class is merely a blank wall between the students and the teachers.

II. LITERATURE SURVEY

Adithya Nigam(Springer Conference) et el…,[1] "A Systematic Review on AI-Based Proctoring Systems: Past, Present and Future" This paper potrays about Online testing is the following rush of reception after internet realizing which has seen a critical ascent popular because of the issues presented by the continuous COVID-19 Pandemic. Web based Proctoring Systems don't actually be totally idiot proof however are quickly changing the reception of internet testing from home, a situation that beforehand would have been believed to be unbelievable among the majority. With the coming of Online Proctoring Software, security issues related with it are duplicating and are a reason for authentic concern.

Carina S. et el… "Implementation of E-Proctoring in Online Teaching: A Study about Motivational Factors" the paper was published, by This paper demonstrates about Infante-Moro Web based education, actually doesn't offer total remote instructing as a rule, since there are numerous organizations that, in the assessment cycle, keep on requiring the actual presence of the understudy in a particular spot to join the understudy and the inspector in said place, for administrative reasons. In any case, there are now e-delegating instruments that permit this cycle to be done from a distance, without expecting that actual presence.

Yousef Atoum, et el…, "Automated Online Exam Proctoring". The intention of this paper is to introduce a sight and sound investigation framework for online test delegating, which expects to keep up with scholastic respectability in e-learning. From the viewpoint of the message taker, the framework is both conservative and easy to work, since it simply requires two essential cameras and a receiver.

Daniel Woldead et el…,"21st Century assessment: Online proctoring, test anxiety, and student performance". This study found that students with high trait test anxiety score worse on examinations, and this is especially true for students with high text anxiety who take exams in an online proctored environment.

Karen S. Fiano et el…,"The Need for New Guidelines and Training for Remote/Online Testing and Proctoring". Schools and colleges immediately transferred delivery and evaluation of educational curriculum online after the release of COVID-19. Institutions have to assess and alter present examination rules and procedures to accommodate new methods of test administration and proctoring due to the quick move to testing students off campus and away from conventional in-person proctored situations.

Beverly Paris et el…, "An Analysis of Academic Integrity Techniques Used in Online Courses at a Southern University."
TEACHING ONLINE COURSES HAS ITS DIFFICULTIES: If you ask any teacher who has never taught an online course what their greatest concern would be if they did, they'll almost certainly respond "keeping the course's academic integrity." Another issue that these teachers are likely to be concerned about is the various ways in which students might misrepresent themselves online. This can happen if the registered student

has someone else take their exam or finish their coursework.

Istiak Ahmad et el…, “A Novel Deep Learning-based Online Proctoring System using Face Recognition, Eye Blinking, and Object Detection Techniques”, Due to a multitude of advantages such as efficiency, flexibility, affordability, and usability, distance and online learning (or e-learning) has become the norm in training and education.Furthermore, because to the COVID-19 pandemic's physical isolation restrictions, online learning has become the sole alternative. Due to the lack of physical presence, monitoring attendance and students throughout courses, particularly during tests, is a big difficulty for online systems. It is necessary to create methods and technology that give reliable instruments for detecting unfair, unethical, and unlawful behaviour in classrooms and tests.

Connie Barber, “From Stress to Success: Leveraging the Online Experience for Information Systems Students”. The pandemic of the coronavirus illness of 2019 (COVID-19) in 2020 forced colleges all over the world to switch to distance learning. Higher education was severely disrupted, and graduate and undergraduate students' stress levels were affected. However, remote learning may be implemented in a less stressful manner that still helps students prepare for a digital workplace. Students may also be able to improve their digital skills through various kinds of remote learning.

III. RELATED WORK

The demand for online learning has risen dramatically over the years. Researchers have offered several approaches for proctoring online exams and classes in the most effective and convenient manner while maintaining academic integrity. Proctoring does not imply that test/class participants are allowed to cheat or become distracted in a variety of ways. Distraction and cheating are instead minimized in a variety of ways. One frequent method for proctoring online tests is to use online human supervision. The most significant downside is that it is highly costly since it requires a large number of employees to watch the test takers.Researchers have also proposed several comprehensive monitoring solutions, using tools which help in identifying frauds and cheating techniques, like if more the one person is in a frame, or if the tab is being changed frequently, and many others. But even using all these the teachers would want to monitor these activities of students.

IV. IMPLEMENTATION

How our application works :

Whenever a class is scheduled and teacher opens up our application, all students who have joined the meeting will appear on the dashboard. Each and every students’ camera will be activated and starts capturing the surrounding, our featuristic capabilities include ; Face detection, face spoofing detection, phone detection, drowsiness detection, person count. So whenever a student does one of the above, his profile will be prioritized to the top of the dashboard and the teacher can take action and monitor it accordingly. And the teacher profile includes all the classes she is assigned to in her respective subject and sections. Also the details of the students activites will be directly updated in the database and stored. From this teachers will have the control over the class just as in physical classes and they will be able help the students in ways that are required.

V. EXPERIMENTAL RESULTS

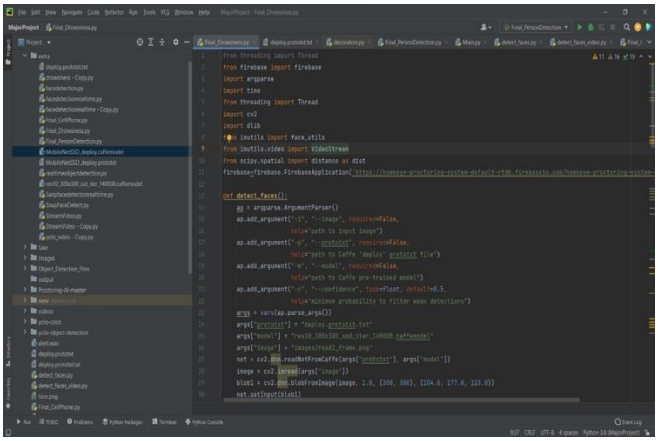


Fig. 1. Imported methods

Fig. 1. shows the imported libraries for using the face detection and other features of our tool.

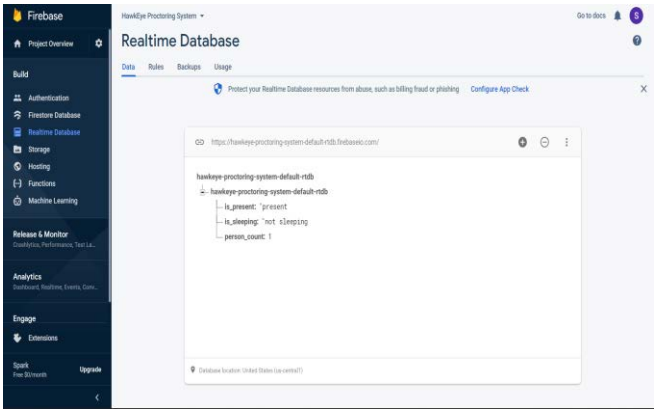


Fig. 2. Firebase used for storing results

Fig. 2. shows how the data is updated in realtime in the database.

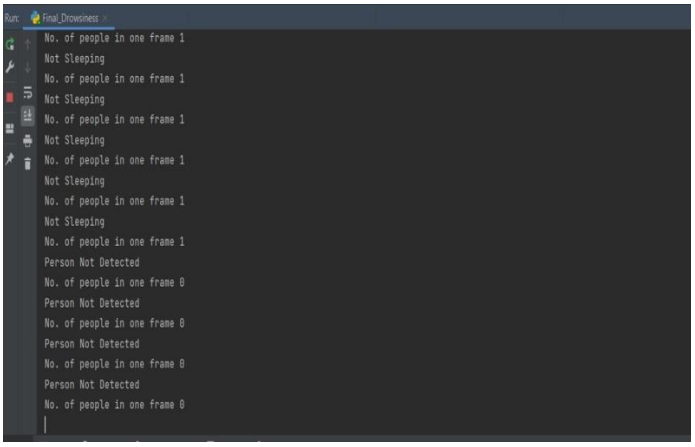
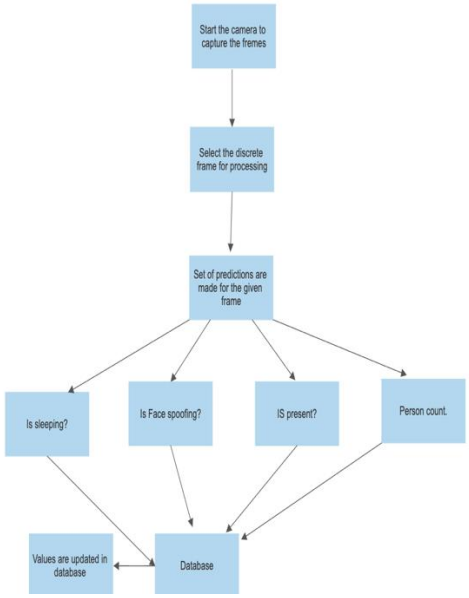


Fig. 3 . Results of the person count and drowsiness alert

Fig. 3 . shows the results (number of people in a frame) on the terminal. We have hidden the camera interface so as to reduce the performance of CPU for efficiency.

VI. METHODOLOGY



The AI-based remote proctoring process is repeated thousands of times to develop, train and refine every event defined in the system. An event can be a single behavior or indicative of identity fraud, content theft and cheating behavior.For example, if someone is found looking off-screen to the left, it can be considered as a single data point and that specific portion of the video is segmented and labeled as unfair means. Once the number of such data points of the same behavior goes beyond the limit, the continuous event of building, training and refining is initiated.Each of the thousands of events that execute through the process is categorized as potential fraud, theft or cheating. All the events would result in whether or not the session should be marked with a suspected breach of integrity.

VII. PROCTORING SYSTEM METHODS

1) Face detection: is a feature which helps in detecting a person, and verifies his actual presence in the photos and videos. This one kind of way to detect similarities of objects in a certain digitall class of multimedia.

2) Face Anti-Spoofing: To impersonate another person in our technical reality, masks are most often used or photos of the native person. Face

Anti-Spoofing is a set of protective measures to counter such deception.

3) Phone Detection: This is helpful when the student is using a phone while class is going on, this functionality detects and updates the same on the dashboard. If the student denies using it, this functionality captures the student in the act.

4) Person Count: It will display the number of people present inside a frame. This is helpful in knowing if the student is concentrating on the class or having fun with their friends.

5) Drowsiness Detection : It shows if a person is sleepy, by detecting the eyeball tracking and using parabaolic equation , it can alert the teachers if a student is sleepy or not.

VIII. FUTURE SCOPE

In the future developments of our project we will enhance the AI to produce more accurate results, new features relating to real world could be included, we can conduct online exam directly from our application. We want to create a platform where teachers and students interatct just like how they do in real world classes. Interation totally depends on how the class goes and how the students receive it, as it's virtual, it will be difficult to control and proctor it, so making it very feasible for both of them is our main goal. More immerse interaction can be brought with tools relating to schooling , teaching, lab can be taught with more enaging and interactable classes.

IX. CONCLUSION

By allowing everything to be done online, remote proctoring has the potential to revolutionise the education industry. AI-enabled computer systems may assure the authenticity of students in front of the camera by preventing them from being distracted outside of class, allowing them to connect with professors more regularly. We also learnt about new AI stages, deep earning, and web development. This guarantees that no student is left behind when it comes to the information and skills and knowledge, that teachers have placed upon them. This tool may be used on a variety of websites, integrated with one another. More than anything else the main conclusion we come to is for the sake of professors and students where they have an impeccable interaction.

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Traffic Sign, Traffic Signal& Lane Detection Using CNN

Manasa K N[1]

Priyanshu Raj[2]

Rounak Jaiswal[3]

Sachin R Patil[4]

R S Sai Naveen[5]

School of Computer Science and Engineering, REVA University

ABSTRACT

This Project acknowledges the road, alerts, prevent signs, responding and making decisions, consisting of converting the path of the vehicle, preventing crimson alerts, preventing signs, and shifting on go alerts with the usage of Neural Network. The software program tracks visitors via hard-coded regulations, preventive algorithms, predictive modeling, and "smart" separation of objects, to assist the software application to follow regulations on transport. The Main Objective of Building this Project is to reduce Road Accident by Giving Assistance to Drive so that Driver can get alert of Turn, Sign, Signal etc. in addition to their own Presence.

INTRODUCTION

The Driver needs to monitor signals, road safety signs, barriers, and lanes for traditional cars and make decisions accordingly. Though autonomous driving can be dangerous to someyet it also has its advantages. This would conclude in reducing traffic congestion, reduced emissions, lower travel costs for all, and a reduction in the cost of new roads and services. It would also result in improvingthe mobility of people with old and physical disabilities. The way of achieving the autonomy of cars is to model it on RC cars on the 1/10 scale. With the aid of the pi camera and the ultrasonic sensor, the car can sense its environment, and could collect data and transmit on the server through the Raspberry Pi.

In this System we will give Driver an Assistance which will guide them on where to turn left, right, or straight and what type of signal will come in a short span of time, so that Driver can Preciously right decision in each time and eventually this will reduce the road accident which nowadays occurs in the large amount due to the negligence of the driver.

OBJECTIVES

The main working model of the project are as follows:

- To design a model for using the lane detection with the help of CNN
- To design a model for using the traffic signal with the help of Haar cascade
- To design a model for using the sign boards with the help of+ CNN

LITERATURE SURVEY

[1] Working model of Self-driving car using Convolutional Neural Network, Raspberry Pi and Arduino in year 2018. The proposed model takes an image with the help of Pi cam attached with Raspberry Pi on the car. The Raspberry Pi and the laptop is connected to the same network, the Raspberry Pi sends the captured image to the Convolutional Neural Network. The image is gray scaled before passing it to the Neural Network. Upon prediction the model gives one of the four outputs i.e., left, right, forward or stop.

[2] Self-Driving Cars: A Peep into the Future in year 2017. This paper elaborates about a unique technique embedded controller design of a self-driving, electrified, accident proof and GSM destination guided vehicle.

[3] Self-Driving and Driver Relaxing Vehicle in year 2016. This paper focuses on modified concept of Google car, the Google car has to reach the static destination automatically.

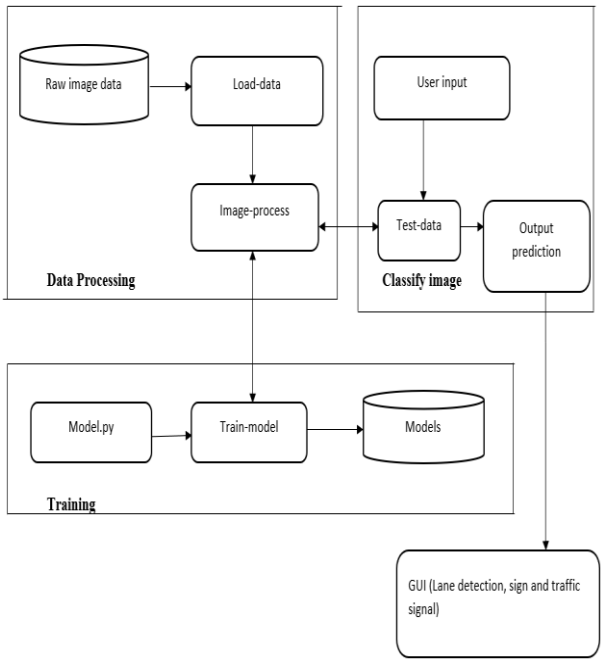
[4] The Issues and the Possible Solutions for Implementing Self Driving Cars in Bangladesh in 2017. Some of the issues of Bangladeshi roads and traffic Conditions and their solutions are highlighted in a paper.

[5] Real-time multiple vehicle detection and tracking from a moving vehicle in 2000. The project uses the Rapidly Adapting Lateral Position Handler to determine the coordinates of the road ahead and the appropriate steering direction modules for detection of other vehicles on the road.

Problem Definition

Autonomous vehicles are the development of technology in the field of automobiles. Due to increase in vehicles, the frequency of traffic is more. To solve this traffic problem, traffic rules are made. But as the people neglect traffic rules, accident occursand the reason behind the accidents is due to human carelessness. To suppress these accidents and to improve safety transportation we require Autonomous Vehicle. The driver's mistake is one of the most common causes of road accidents. As the number of accidents rose from day to day, it became important to correcthuman mistakes and helping humanity for their easy lives.

PROPOSED SYSTEM

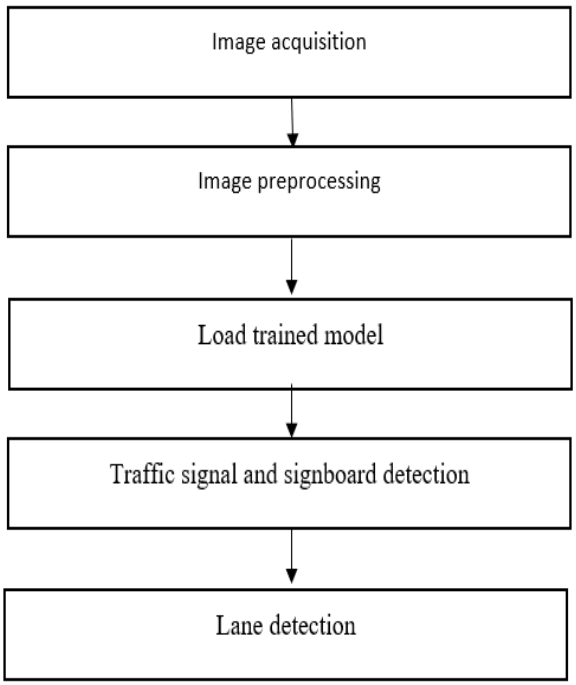


Data Filtering: The loaded data.py script includes functions for loading unprocessed picture data and saving it as numpy arrays in the local storage. The process data.py script imports picture input from data.npy and preprocesses it by reformatting it, implementing filtration, and ZCA brightening to improve characteristics.

Training: The classifier is constructed using hyper - parameters from a config file that includes the learning rate, block size, imagery filtering, and epochs. The calibration and validation datasets are equipped as Data loaders within the training loop, and the classifier is designed using the Adam Optimizer with Cross Entropy Loss.

Classify: After a classifier is trained, it may be used to identify images that are stored as files on the file system. The user specifies the picture's file location, which the test main.py script passes to process main.py, which loads and preprocesses the file.

METHODOLOGY

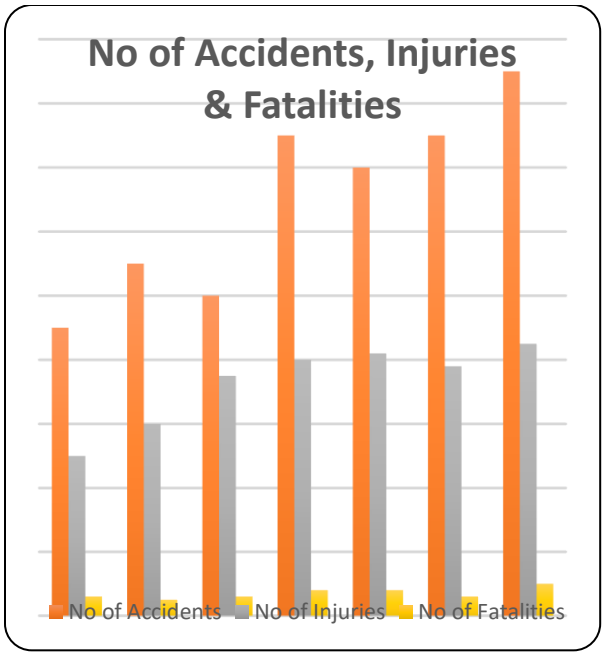


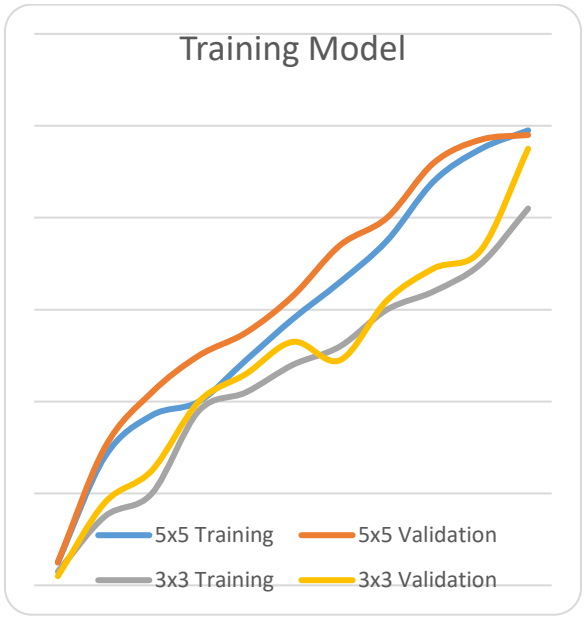
In the working Methodology, first, we capture the Image which is ocated on the roadside and then we crop out all unnecessary parts then we send that image for Processing. After that we have already trained the model and then comparison occurs, and best suits results are displayed on screen and then appropriate action will be taken based on Results.

EXPECTED OUTCOME

Deep learning algorithms like CNN (Convolution neural networks) is assigned to make real time decisions for the self-driving car. This project will make use of lane detection and traffic sign detection.

RESULT





This is the result we got after the training and testing with the data to achieve nearly 98% accuracy.

CONCLUSION

Many automobile firms are attempting to develop their own self-driving vehicles, which is the way of the future. The most significant components of automated vehicles are the lane, traffic, and road sign detection and recognition systems. The presented technology can be installed in just about any vehicle and therefore can identify and recognize objects. Additionally, drivers could use this to be awake and aware of road conditions. As a result, both the driver and the passengers will be safe.

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Smart Specs

Dr. Arun Biradar[1*], Shilpa R[2] ,Seema Jatta Naik[3] ,Shilpa[4] , Sujana A R[5]
[1,2,3,4,5] School of Computer Science and Engineering, REVA University, Bengaluru, India-562149
[1]arun.biradar@reva.edu.in,[2]r18cs396@cit.reva.edu.in,[3]r18cs377@cit.reva.edu.in,
[4]r18cs395@cit.reva.edu.in, [5]18cs427@cit.reva.edu.in

Abstract

The World Health Organization estimates that 285 million people globally are partially blind from a total of 7.4 billion. It has been noticed that they're already having difficulty rolling their everyday lives, and it is critical to make the required calculations using new technology to assist them in coping with the current world, regardless of disabilities. A smart spec is provided to read any textual content in audible format with the goal of providing an inventive, efficient, and actual system that produces excellent results without incurring a lot of money. Because reading written materials is difficult for disabled individuals across many settings, it allows them to be self-sufficient. The textual imagery from of the written material is taken with the Pi camera, and the acquired picture is processed with Tesseract-OCR. For the research, data in the formats of jpeg, png, jpg, BMP, and others is used. The picture is then analyzed, and the collected text is transformed into letters using OCR/Tesseract software, which will then be rendered legible using eSpeak software. Scanning, processing, categorization, and recognition are all part of the OCR algorithm. Lastly, the OCR file is converted into spoken requests using the eSpeak command program. A loudspeaker attached to the Raspberry Pi reads the transformed voice audibly. To sense a collapse, a tilt sensor is employed.

Keywords— disabilities, scanning, espeak, sensors

I. INTRODUCTION

40 million of the 215 million visually impaired individuals in the world [1-4] are blind. According to NHIS survey, an approximate 25.2 million adult Americans (almost 8% of the population) are blind or visually impaired in certain affluent countries, such as the United States. Recent advances in computational recognition, camcorders, and laptop devices make it possible to help these people by creating camera-based devices that integrate machine vision expertise with the other commercially available products like OCR systems. For blind and visually impaired people, reading word docs can be difficult in a variety of contexts, including written passages out and about and viewing text in much less

surroundings. The objective is to encourage blind individuals to contact written texts and updated at least voice output. The use of two methods that are crucial to these systems, namely ocr for TIE [5-12] and TTTS to transform this text to speech, is considered for the success of these processes.

A TTS synthesiser is a machine device that must be capable of reading any reading text if an user enters it straightforwardly into the machine [13-23]. Text Data Retrieval is the most significant feature of any helpful scanning technology, and it's also an essential part of OCR since it dictates the quality of the produced speech [24-32]. TtS output quality, and also expanding our opportunity to produce creative, feelings artificial voice. To divide video chunks into textual and non-text regions, intelligent video surveillance text detection and retrieval were used. It's feasible thanks to recent advances in machine learning, camcorders, and processors, which have supports the creation of camera-based goods that combine computer vision technology with other useful products like OCR systems. Text recognition is done using OCR. It is capable of correctly recognizing main character, text, and phrases. OCR, which is also the digital translation of images obtained of typewritten, has a significant increase of identification [33-36].

II. LITERATURE SURVEY

As per the WHO, roughly 285 million individuals are believed to be legally blind out of a demographic of 7.4 billion. It has been noticed that they continue to struggle with the day tasks, but it is essential to take the required steps using developing technology to assist people in living in the contemporary world despite existing disabilities. With the intention of assisting them, the authors in [1] have developed a perfect spec for blind people that can identify text and then produce a vocal output. This can assist visually handicapped people in reading any printed material aloud.

Routing is challenging for such blind users because they mostly lack sufficient knowledge to avoid impediments and dangers. Electronic Travel Aids (ETAs) are sensor-based gadgets that facilitate and enhance the movement of blind people in terms of reliability and efficiency [2]. Contemporary ETAs do not have straight and unambiguous location data. To assist blind people with guidance, this research in [2] presents an approach for calculating range that used a stereo matching algorithm. The system established in this paper comprises of a portable computer, video camera, and audio headphones all moulded into a headgear. To compute dense disparity pictures, an enhanced location stereo matching is done over the altered images.

SR technologies were tested in a variety of school settings to help students turn oral instructions into writing electronically. In situ culture and human sciences teaching classes using standard classroom technology, basically two approaches of (SR-MLA), RTC and PLT were investigated. Both techniques were evaluated in terms of class application technical feasibility and dependability, instructor perspectives, sight word correctness, and school school grades. During classroom, RTC offered pupils with a close representation of the instructor's voice.

The research presented in [3-4] advances to current progress in the area of increased succeeding TTS technology. The increase of vocal richness and synthesis adaptability are two of the most popular areas of study in this field. In this respect, this work introduces a new TTS approach for synthesising across genres dubbed multidomain TTS (MD-TTS). Even though the simulation and model - based theory is widely used in spoken speech patterns, there has been little study into applying it to TTS. Many ideas are presented in this study to do this. First, in the standard TTS design, a text classifier (TC) is incorporated to automatically identify the most relevant domain for synthesizing the text information among crowded backdrops or other nearby items.

Portable computer sight is frequently promoted as a viable approach for assisting blind individuals with daily tasks. Nevertheless, there's really currently so little knowledge with blind individuals operating remote sight devices. This work in [4-5] is an experimental investigation of a key indicator wayfinding system that identifies particular color markers using a digicam smartphone. The findings reported in the literature could be utilized to help build equipment that allows people to explore their surroundings without using their eyes.

III. METHODOLGY

The suggested program's idea is to build a word reading system for visually impaired individuals using a specs reader. This structure is divided into three modules: OCR Module, Camera Module, and Text-To-Speech Module. This clarifies the textual scanning approach for visually disabled people who don't want be dependent on anyone.

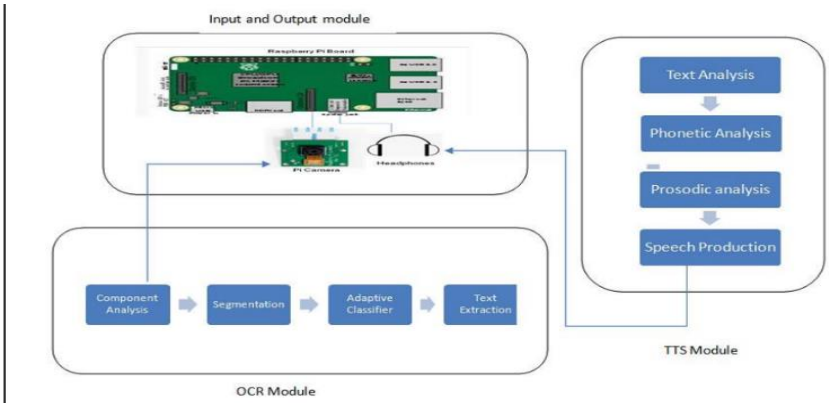

Fig.1. Various components together used in this work

a. Working Principle:

The structure is predicated on a Raspberry Pi board with Raspbian OS and Python/OpenCV modules installed. Again for study, words inside the formats (jpeg, png, jpg, BMP, etc.) are used. For identifying related text, the picture acquired out from Pi camera is divided in the three signs, as explained below. The picture is then analyzed, and the collected text is transformed into characters using OCR/Tesseract software, which can then be made legible using eSpeak software. To identify impediments and identify falls, we'll utilise an ultrasonic sensor and a tilt sensor. The collapse recognition is provided as an IoT notice to the individual affected.

The suggested program's aim was to create a textual process enhancements for visually challenged people using a specifications reader.

A. Camera Module

Everyone of OpenCV's catch techniques (record, capturing ongoing, seize series) must be weighed in terms of their utility and capabilities. The capturing series technique was selected for this study since it is by far the quickest. Our Raspberry Pi camera can capture images at a rate of 20 frames per second at a resolution of 640x480 using the capture series approach.

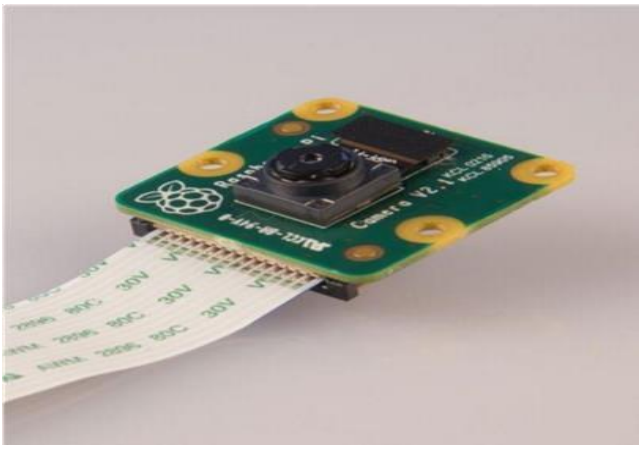

Fig.2. Camera Module

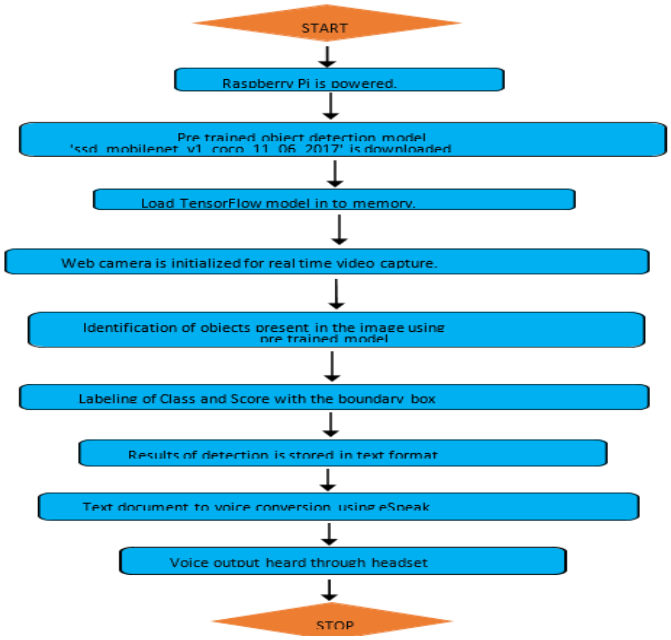

Fig.3. Flowchart of the work

B. OCR Module

TOCR is selected for the work to precisely put the message inside a sentence. TOCR outperformed the majority of commercial OCR systems. It requires a standard stage process workflow for decoding. The analysis is done in the initial stage, and the constituent shapes are saved. This stage is extremely computationally costly, but it provides various benefits, including the ability to read flipped letters and the ability to recognise black writing on a white background. The contours and areas are then evaluated as blobs after such phase. The technique embedded in the OCR breaks the line segments to letter squares for alignment. The evaluation plan is then separated into two sections: adaptive and template classifiers.

C. eSpeak is a small free software voice converter for Linux and Windows that employs a "consonance synthesis" process to prepare English and other languages. This enables a large number of languages to be supplied in a little space. The biggest benefit of adopting eSpeak is the clarity of the voice, which can be used at fast rates.

D. Hardware tools

- Raspberry pi
- Pi camera
- ESP 8266 Wifi Module
- Speakers
- Ultrasonic Sensor ADXl Tilt Sensor
- Software Tools:
- Raspbian OS
- Python

- OpenCV
- eSpeak
- OCR Tessearact

IV. RESULTS

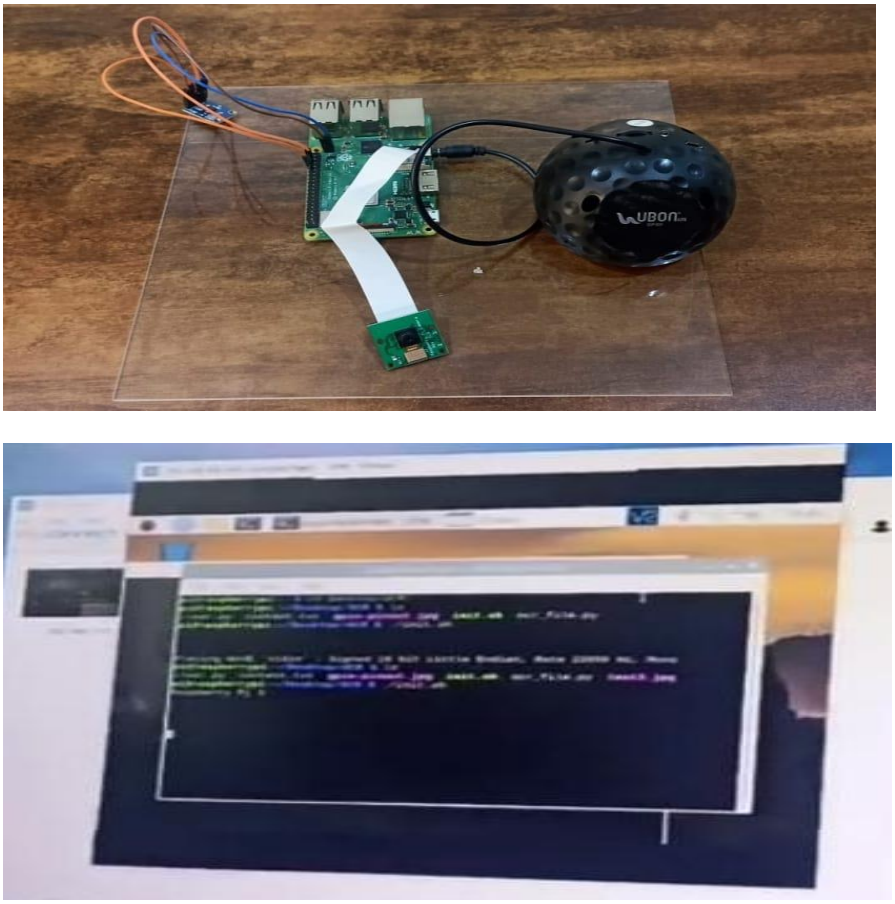

Fig.4. Result of this work

The Fig.4 shows the experimental result. The objectives if the project is met and can be seen in the Fig.4.

V. CONCLUSION

The system uses a basic architecture to convert visual data taken with a camera into spoken data using a Raspberry Pi. Unlike most other systems available, the user merely gets to wear the hat to run it, and no special abilities are required. The suggested fix is both affordable and adaptable. It should not need any fixed skills from the person who uses it. Any blind or visually impaired individual may use because all they have to do is turn it on. The technology aids in direction prediction and identification of the surroundings. The device is a real-time monitoring system that gives acoustic information about the area, making navigation safer and more secure.

Blind persons will benefit greatly from the pilot system in terms of navigation. The amount of artefacts can be counted using image classification. The COCO model is utilised to train the SSD mobile net in this paper, that can only detect 90 object classes. We can expand the set of items by building the classifier independently. Recognition system can also be included so that the blind person can recognise his or her family and friends.

We tested our algorithm on a variety of photos and discovered that it converts them correctly. The gadget is small and useful to society.

To address this challenge, this research study has proposed a pilot system solution that can be utilized by the visually impaired for normal activities, especially during disaster situations. This Pilot system device provides real-time navigation and a narrative system. The device is cost-effective (about NZD 200), which makes it affordable and accessible

for the wider community who suffer from this problem. We hope that this proposed pilot system can be a step toward providing the visually-impaired people with the missing support and services they so desperately need during and after disaster situations. This research work is only a proof of work; in our future work, we hope to make a completely standalone version with additional assistive functionalities for the blind.

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PERSONALITY PREDICTION BASED ON HANDWRITING ANALYSIS(GRAPHOLOGY) USING SUPPORT VECTOR MACHINE

Tejashree A J, Swathi Ghosh P , Thriveni V, Sohara Banu A R

School of Computer Science and Engineering,
REVA University, Bengaluru.

Abstract.

Personality is a term that refers to a person's strengths and flaws. Handwriting, among all the distinctive traits of a human being, has the most information for gaining insights into the writer's physical, emotional, and mental state. Graphology can be used to determine a person's personality. Graphology is the science of examining and analyzing handwriting. It is a scientific approach for determining a person's personality traits such as fear, honesty, and defensiveness by evaluating numerous traits in the handwriting. The page margin, the baseline, letter size, pen pressure, the slant of the alphabets, line spacing, and word spacing are the most important aspects of handwriting to consider. All of these characteristics can reveal a lot about a person. Emotional stability, Will Power, Modesty, Lack of discipline, Personal Harmony, Non-communicativeness, Social Isolation, and poor concentration are some of the personality qualities that our project aims to predict.

We decided to use a supervised learning model called a support vector machine. The advantages listed above influenced our decision to use a support vector machine. It's effective in high-dimensional spaces, memory-efficient, and versatile: the decision function can be set with multiple Kernel functions. Custom kernels can be supplied in addition to the standard kernels.

Hiring a graphologist could be expensive, time consuming and accuracy is unpredictable, hence we intend to build a machine learning model which could do the same job as a graphologist but cost effective, time efficient and gives us more accuracy.

Keywords—SVM, Graphology, Personality prediction

1. INTRODUCTION

Handwriting, often known as brain-writing, is a powerful tool for determining an individual's personality characteristics. The handwriting of a person can reveal a lot about them. Personality traits can be discovered and understood using patterns and strokes in handwriting. Graphology is the name of this technique. Fear, honesty, a defensive personality, and many other personality traits are confirmed by handwriting. Graphology is a discipline that uses spaces, strokes, and curves in a drawing to determine, research, and interpret a person's personality using handwriting. Handwriting is nothing more than a subconscious mental expression, according to Graphology. It can either help the person in overcoming his/her personality crisis. A Graphologist is someone who analyses people's handwriting and if the graphology test is performed manually, it may take a lot of time due

to the number of factors that are examined in graphology. Furthermore, handwriting analysis accuracy is dependent on the analyst's ability level. Handwriting analysis may now be done automatically, thanks to advancements in image processing and pattern recognition. Because engaging a graphologist can be costly, this technology ensures economic feasibility and efficacy. It can also analyze more documents in less time. This application aids in the identification of personality on a wide scale in a short period of time, such as for mass recruiting in a firm, hiring for a specific position in a company, or matrimony sites.

2. LITERATURE SURVEY

AUTHOR	SYSTEM	METHODOLOGY	PERFORMANCE	LIMITATIONS / (DRAWBACKS)
Evi Septiana Pane and Adhi Dharma Wibawa, Harris Teguh Laga	Personality Classification from Online Handwritten Signature using KNN	k-Nearest Neighbors (KNN)	87.5% accuracy	Due to the digitization process, digital devices cause a shift in people's signatures from their original version.
Shitala Prasad, Vivek Kumar Singh, Akshay Sapre.	Personality Predictor	Support Vector Machine	90.3% accuracy	Inaccurate feature selection
Bharti W. Gawali and Vaishali R. Lokhande	Analysis of Sign for the Prediction of Personality Traits	ANN and Structural identification algorithms	95.4% accuracy	Only used five features to come to a conclusion

Krish Shah; Rajas Rade; Dharmil Shah;Nikita Lemos;	Personality Prediction based on Handwriting using Machine Learning	CNN (Convolutional Neural Network)	The total of each percentage of personality attribute equals 100 percent.	For the CNN model to be developed, the system requires a lot of processing power.

The rationale for utilizing Support Vector Machine is to tackle a problem that other models have failed to handle, such as not selecting crucial basic features or selecting a model that does not produce accurate results.

3. REQUIREMENTS

- Software Components

a) Open CV

OpenCV is an amazing image processing and computer vision software. It's an open-source library that may be used for things like facial recognition, object tracking, and landmark recognition, among other things. Python, Java, and C++ are just a few of the programming languages available. [19]

b) Python 3.7

Python is used over MATLAB because it is more straightforward to set up and use. Python is a good choice for our research because it includes a huge number of free image processing and machine learning libraries.

c) NumPy

Numpy is mainly used to deal with the matrix of any dimensions, and perform standard mathematical and scientific computations which helps in calculating variety of tasks.Matlab, A prominent technology computing platform is replaced with this combination .Numpy also has an advantage of being free and open-source.

d) Scikit-learn

Scikit-learn is the most accessible and machine learning library. It uses a Python consistency interface to deliver a set of efficient machine learning and statistical model capabilities, such as classification, regression, clustering, and dimensionality reduction. NumPy, SciPy, and Matplotlib are the foundations of this Python-based toolkit.

e) Streamlit

Streamlit is used to build web apps of data science and machine learning ,it takes very less time in building and deploying the apps .It allows to write streamlit app code which is the same like that we do write in python .The outcomes of streamlit are pretty straightforward.

b) Support Vector Machine-SVM

SVM is a supervised ML approach for classifying and predicting data and attempts to find a hyperplane in an N-dimensional space that categorizes data points clearly.

Two independent variables: X1 and X2

One dependent variable: A blue or red circle.

As shown in the diagram,

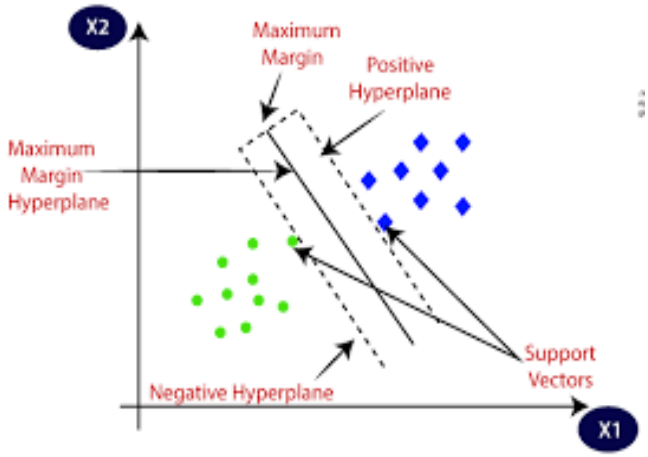

Fig -1: Separating two classes of data points with the SVM algorithm.

As you can see in the graphic above, there are multiple lines that split or categorize our data points into red and blue circles.

Optimal hyperplane, Choose the one with the greatest difference. If classes are completely linearly separable, a hard-margin can be used. A soft-margin is required otherwise. SVM overcomes this by using a kernel to produce a new variable if the data isn't linearly separable.

When there is a non-linear separation, the SVM kernel does some extremely sophisticated data transformations before deciding on the best approach for separating the data based on the labels.

Radial Basis Function is a commonly used kernel in SVC:

$$k(x,y) = \exp\left(-\frac{\|x-y\|^2}{2\sigma^2}\right)$$

Where $||x-y||^2$ is the squared Euclidean distance between two data points x and y.

There are two parameters in the RBF kernel: gamma and C.

Gamma is an RBF kernel parameter that represents the spread of the kernel and thus the decision region. The 'curve' of the choice border is very low when gamma is low, resulting in a reasonably broad decision zone. The decision boundary's 'curve' is high when gamma is large, resulting in decision-boundary islands encircling data points.

C: The penalty for incorrectly categorizing a data point is C, which is an SVC learner parameter. The classifier doesn't mind if data points are misclassified when C is tiny (high bias, low variance). Because misclassified data is heavily penalized when C is large, the classifier goes to great lengths to avoid misclassified data (low bias, high variance).

4. FLOW OF SYSTEM

Fig -2: Flow of system

5. IMPLEMENTATION METHODOLOGY

a) Data Acquisition

We used the dataset from The IAM Handwriting Database which is avaliable on Computer Vision and Artificial Intelligence INF. The data is easily downloaded and can be used for non-commercial research. 657 writers provided samples of their handwriting to the collection, which has 1538 pages of scanned text. By physically studying each paper, each handwriting sample is identified with the associated psychological qualities. With the help of an automatic action script, these photos are trimmed and saved as PNG images. The image now has a height dictated by the handwriting content and a width of 850 pixels.

b) Pre-processing

Unwanted noise, printed phrases, and lines can be found in the handwriting photos we collected. By default, the source photographs have a very high resolution. Pre-processing is used to prepare picture data for feature extraction by removing unnecessary properties, improving quality, and applying transformations. This section discusses the procedures used in pre-processing.

i.Image Resolution and Cropping

An action script in Adobe Photoshop is used to crop out the left and right margins, resize all the photos to 850 pixels width and perspective height, and save them in PNG format.

ii.Image noise removal

Image noise is an electrical noise that is characterized as a random variation in image brightness or color information. The use of a bilateral filter to remove these disruptions is beneficial since it keeps the edges of the image's elements, which is desirable. A bilateral filter is a nonlinear image smoothing filter that keeps edges while reducing noise. It replaces each pixel's intensity with a weighted average of intensity data from nearby pixels.

iii.Grayscale and Binarization

Conversion to grayscale and binarization are crucial aspects of the pipeline for obtaining handwriting information. Inverted global thresholding is used to transform the image instances to grayscale and binarize them. A pixel in a binary image can be either 0 (black) or 255 (white) (white). A simple threshold can be used to divide all pixels in the picture plane into foreground and background pixels, i.e. the handwriting itself and the white background of the paper, in order to form the two-valued binary image. Then, using an inverted binary image function, pixels above a certain threshold (foreground) are converted to 255, while pixels below the threshold (background) are converted to 0. This operation of thresholding can be written as:

$$\texttt{dst}(x,y) = \begin{cases} 0 & \text{if } \texttt{src}(x,y) > \texttt{thresh} \\ \texttt{maxVal} & \text{otherwise} \end{cases}$$

The new pixel intensity = 0, when src(x,y) > threshold.

else it is set to maxVal

iv.Contour and Warp Affine Transformation

Following noise removal and picture conversion to grayscale and inverse binarization, the lines of the handwriting are straightened using the OpenCV library's dilation, contour, and warp affine transformations. Further processes using horizontal projection of the image to extract these handwriting lines will produce better results.

Before you can see the contours of a picture, you must first dilate it. Combining an image A with a kernel B, which is usually circular or square, is a dilation operation. Kernel B's anchor point is typically the kernel's core.

We compute the highest pixel value overlapped by B as the kernel B scans and updates the image.

Bright areas of an image grow as a result of this maximizing technique (therefore the name dilation).

The limits of an object in an image are represented by a contour, which is a closed curve of points or line segments. Correct contour extraction will yield more accurate features, increasing the likelihood of accurately identifying a given pattern.

The warp affine transformation rotates the contours on a picture so that the handwriting's baseline is strictly horizontal. One of the seven features afterwards is the angle of rotational transformation returned by the procedure.

c) Feature Extraction

i) Extraction of Baseline

For baseline extraction, follow the steps listed below.

1. The image is converted to a binary image using inverted binary thresholding with a threshold of 120. The foreground (handwriting) pixels are now black while the background pixels are white.

2. A 5x100 kernel is used to dilate the image from step 1 such that each line becomes a thick horizontal segment.

3. On the image from step 2, contours can be found. Contours with a height of less than 20 pixels are eliminated since they are not a handwritten line. The remaining contours now depict each line of handwriting or a group of congested lines.

4. The OpenCV minimum area rectangle function takes a contour object and returns as one of the returned values the angle that the contour makes with a hypothetical vertical line. The angle formed by these contours with an imaginary horizontal line is then calculated.

5. The baseline angle, which is our initial feature, is calculated by taking the average of all the contour angles.

6. Around a contour, a rotation matrix is created. The rotation matrix is used to make the contour precisely horizontal by rotating it by its baseline angle in the opposite direction. This procedure aids in the maximization of horizontal projection operations' effectiveness.

ii) Extraction of Individual Lines

Below is the algorithm for extracting individual lines: 1. The horizontal projection of the straightened images captured from baseline extraction is found in a python list called hpList.

2. The hpList gets scanned in reverse order. Some horizontal projection values, such as 0, depict blank space rows. A pixel row with a non-zero hpList value is one that encounters at least one foreground pixel (contour). From the commencement of a non-zero value through the next zero value, each contour is identified.

3. If there is a group of congested lines, the contour is scanned again to extract individual lines. At the intersection of the line above and the line below, a contour with a dense set of lines will have an extremely low hpList value. To detect such rows, a threshold is set. As it moves from the top of each line to the bottom, the hpList will progressively climb, then decrease. The hpList value is less than the barrier around the bottom region, indicating that

this line and the following line are overlapping. This line's end index and the next line's start index comes out from the index of the previous line.

4. Repeat step 4 for each of the contours discovered in step 2. We will have the starting and ending indexes of all the individual lines by the end.

iii) Extraction of Letter Size

To estimate letter size, the horizontal projection of each line extracted in the previous procedure is scanned. The number of consecutive rows with a projection value greater than a threshold is counted. The average letter size of all the lines will be used to establish our letter size. This only takes into account the size of the midzone, ignoring the upper and lower zones.

iv) Extraction of Line Spacing

1. Except for the top margin, the entire number of rows with horizontal projection 0 is counted. Let's just call it that.

2. In the retrieved lines, the total number of rows with horizontal projection less than a threshold is counted. Let's name it b for now. These are made up of the lines' upper and lower zones. (Finding the letter size required this step as well.)

3. The number of extracted lines in the manuscript is n. The entity x = a + b/n calculates the average handwriting line spacing.

4. To make the final line spacing proportional to the size of the handwriting, divide x by the letter size.

v) Extraction of Word Spacing

Word spacing is defined as follows

1. Each line of the image's vertical projection is generated and stored in a Python list (array).

2. Except for the left and right margins, the number of columns in the list with a value of 0 (column with all pixel values of 0, it is vacant area) is tallied. Let's assume it to be a.

3. The number of words or disconnected letters is determined by the number of non-zero column runs. Let's keep it as b.

4. Now, x = a+b shows the average word spacing while writing.

5. Find the average of these x's across all lines. Let it be y. The word spacing is calculated by dividing the letter size by y, so it is proportional to the handwriting size.

vi)Extraction of Top Margin

To extract the top margin, we simply scan the horizontal projection of the image from top to bottom for its first run of 0's. The amount of 0s determines the height of the top margin, which is then divided by the letter size to make it proportional to the handwriting size.

vii)Extraction of Pen Pressure

Pen Pressure is determined as follows:

1. The image is inverted using the formula: dst[x][y] = 255src[x][y]. This step is computationally very costly.

2. If src(x; y) is less than threshold=100, an inverted binary threshold (THRESH TOZERO) is used, and the new pixel value dst(x; y) is set to 0, otherwise it is kept unchanged.

3. The average value of all the non-zero pixels is taken as the pen pressure. The value is not inverted again (to reverse the effect of step 1) so that higher value would mean higher pen pressure.

viii)Extraction of Slant of Letters

The concept that when the number of columns carrying a continuous stroke reaches its maximum, the word becomes deslanted is used to determine the slant of letters in handwriting. The tilt is determined using the algorithm below.

1. A shear transformation is done to 9 different angles (-45, -30, -15, -5, 0, 5, 15, 30, and 45 degrees).

We get the following histogram.

H(m)=h(m) / Y(m),

where,

The distance between the highest and lowest pixel in the same column is given by y(m).

H(m) is the vertical density. H(m)=1 when column m has a continuous stroke. else, H(m) [0,1].

2. The following function is calculated for each shear converted image.

S = h(i) ^2

3. The slant of the handwriting is the angle that produces the maximum value of S.

d) Classification- Support Vector Machine

The seven raw features obtained from the handwriting samples are normalized into discrete values according to experimentally determined threshold values.

Feature	Normalized Value
Baseline	0 = descending 1 = ascending 2 = straight
Top Margin	0 = medium or bigger 1 = narrow
Letter Size	0 = big 1 = small 2 = medium
Line Spacing	0 = big 1 = small 2 = medium
Word Spacing	0 = big 1 = small 2 = medium
Pen Pressure	0 = heavy 1 = light 2 = medium
Slant Angle	0 = very reclined 1 = a little of moderately reclined 2 = a little inclined 3 = moderately inclined 4 = extremely inclined 5 = straight 6 = irregular

Fig -3: Normalization of Features.

The eight personality traits will be predicted by the combinations of these seven features. Hence, there will be eight separate labels for each personality trait and eight SVM classifiers. The images are labeled by studying each handwriting sample and its corresponding normalized features.

The SVM implementation of Sci-kit Learn Library is used and the eight classifiers are trained with radial basis function (RBF) kernel. Two third of all the images are randomly chosen for training and the remaining is used to find accuracy.

6. RESULT

The eight SVM classifiers are trained with randomly chosen two third of all the images. The remaining images are used to test the accuracy score. The following table shows the accuracy of each classifier.

Classifier	Personality Trait	Accuracy
1	Emotional Stability	100%
2	Mental Energy or Will Power	100%
3	Modesty	100%
4	Personal Harmony and Flexibility	100%
5	Lack of Discipline	100%
6	Poor Concentration	100%
7	Non-communicativeness	100%
8	Social Isolation	100%

Fig -4: Accuracy of the Classifiers

We are able to achieve hundred percent accuracy by using the RBF kernel

7. CONCLUSION

The use of machine learning to analyze an individual's handwriting patterns has been proposed as a tool for predicting some personality traits. We examined extracting seven handwriting variables and predicting eight personality traits using different combinations of them. Each SVM classifier is trained for each of the personality traits. We can estimate personality traits on new handwriting picture samples with remarkable accuracy and efficiency after a reasonable amount of training.

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Credit Card Fraud Detection using Machine Learning

[1]Aditya Kumar Pandey, [2]Aman Srivastava, [3]Aman Kumar Singh, [4]Abhishek Kumar Singh,[5] Dr. Sasidhar Babu Suvanam

School of Computer Science and Engineering, REVA University, Karnataka

[1]R18CS021@cit.reva.edu.in, [2]R18CS033@cit.reva.edu.in,[3] R18CS032@cit.reva.edu.in,
[4]R18CS013@cit.reva.edu.in, [5]sasidharbabu.suvanam@reva.edu.in

Abstract.

Mastercard fraud is growing at a rapid pace, owing to the advancement of current technology and the global interstates of correspondence. Each year, Mastercard fraud costs buyers and the financial institution billions of dollars, and cyber attackers are constantly on the lookout for new guidelines and strategies to commit illegal activities. As a result, extortion identification frameworks have become critical for banks and the monetary establishment in order to limit their losses. Despite this, there is a dearth of distributed writing on Visa's misrepresentation identification procedures, owing to analysts' inability to access the credit card exchanges dataset. Classification methods can be constructed using a variety of Algorithms. In this article, we will evaluate several algorithms and then construct the model with the best performing calculation.

Keywords. Machine Learning, Credit Card, classification methods

1. INTRODUCTION

A customer's account is deemed to be in default if he or she fails to repay the money after a particular notification period specified by the bank. This money is later retrieved from clients with the assistance of collection agencies. Too many defaults will almost certainly cause financial institutions to lose money. It'll be expected to evaluate the probability of a record defaulting and to terminate its processes.

The majority of defaulted accounts occur when financial institutions issue credit cards to customers in order to improve their market value. Certain customers may lack financial literacy and wind-up spending excessively or purposefully do not plan to repay. Financial institutions may be unable to collect funds from some consumers who are unable to repay or who have incorrect credentials. Financial institutions suffer significant financial losses

because of these circumstances. Thus, it is critical to assess the trend of delinquent accounts and take appropriate steps to prevent more fraudulent activities. This will assist in limiting future misfortunes and the number of defaulted records. Machine learning methodologies help in developing systems that significantly improve the likelihood of detecting false representation. A model is proposed and compared to previous models for detecting default payment credit card frauds.

2. LITERATURE SURVEY

The authors have tried the approach of Majority Voting and Adaboosting upon multiple classification models to get a precise prediction of result [2]. In the benchmark dataset the adaboost method gave accuracy for fraud detection up to 82.317% using SVM and gave lowest 42.683% for Random Forrest whereas majority voting gave accuracy of 78.862% for combination of Naïve Bayes and Neural Network algorithm and gave lowest 23.780% for combination of Random Forrest and Gradient Boost. After selecting only relevant features and applying the models on a real time dataset they got 96.078% accuracy with Deep Learning and 98.039% with the combination of Naïve Bayes and Gradient Boost.

The authors executed multiple deep learning models for fraud recognition and assessed their precision [3]. The models implemented were Artificial NN, Recurrent NN, LSTM, Gated Recurrent Unit. They implemented feature engineering to derive important features and used undersampling to balance the uneven dataset. The GRU gave the highest accuracy of 91.6%, LSTM gave accuracy of 91.2%, RNN gave accuracy of 90.433% and ANN gave the lowest accuracy of 88.9%.

The author has focused in on the tree-based ensemble learning [9] to counter the insecurity of conventional Decision Tree. Dataset resembles what has been utilized in this paper. To compare the performances, both weighted and unweighted methods were utilised. Random Forest possesses the most precise testing data. with an accuracy of 82.12%. Adaboost achieved 68.9%, while Logistic Regression achieved 64.64%.

3. ALGORITHMS FOR DEFAULT DETECTION

Allowing frameworks to learn on their own is the goal of Machine Learning. As a result, rather than being tailored to perform a specific action, the framework learns on its own, makes do, and adjusts. Software engineers who are able to access and modify the given information in accordance with the needs of the client are the real focus of this field. There are three types of artificial intelligence: those that are directed, those that are solo, and those that support learning. A type of Machine learning known as "directed learning" is the most widely accepted one. The purpose of this paper is to conduct experiments and assess the results of various Machine learning models.

A. Logistic Regression

Essentially, it is a factual model that utilizes a strategic capacity to envision a paired ward variable. It is frequently used in situations where the possibility of a binary classification exists. It performs well on classes that are easily isolated.

B. K-Nearest Neighbor

It is a characterization and regression technique that is used in a wide assortment of uses. It is based on the resemblance of features. It is alluded to as a non-parametric procedure as it generates no inferences concerning data being used.The calculation determines a point's k-closest neighbors and assigns the point the name with the greatest number of k neighbors. This is a straightforward calculation, which makes it easier to comprehend. KNN is resource intensive due to the way it should register the k-closest neighbors of all preparation data, as well as the fact that all preparation data should be saved as well as calculated.

C. Decision Tree

It is a parallel tree that maps elective outcomes to a collection of issue-related inquiries. The tree begins at the root and gradually grows in quantity as it develops. The leaf nodes replicate the marks, whereas the within nodes address a few critical inquiries and branch left or right as necessary. This procedure is repeated till we reach a leaf node. These inquiries are created utilizing characteristics such as the Gini index. The index causes the information to be as lopsided as possible, creating ambiguity about where the branch should go. While it is a straightforward method that works with both class and mathematical data, it proves to be more perplexing when dealing with highly vulnerable data.

D. Naïve Bayes

It is a predictive classification method, which means that this may generate prediction for multiple classes concurrently. The Naive Bayes corroborates this. Probability - based Classification methods are those that enable the prediction of multiple class characterizations. Conditional probability is used to make the determination. Instead of a single algorithm, this paradigm employs a collection of algorithms that share a common idea. Each characteristic is assumed to contribute equally and independently to the outcome in this model. This model has a number of benefits above other models, including the fact that it requires very little preparation information.

E. Support Vector Machine

It is a type of Controlled Learning strategy used to address Regression and Classification problems. In any case, it is frequently used in Computational challenges involving classification. The SVM calculation's objective is to locate the optimal line or choice limit

that effectively classifies n-layered space, allowing us to order new pieces of information later. A hyperplane is a term that refers to this ideal choice limit. The hyperplane's outlandish focuses/vectors are chosen by SVM.

F. Random Forest

It is a classification technique based on ensemble learning. Random Forest is a flexible, easy-to-use AI calculation that consistently produces fair results, even in the absence of hyper-boundary changes. Additionally, it is a prominent approach due to its simplicity and suitability for regression and classification applications. Random Decision Forests are used to address the issue of overfitting in the training set in decision trees. Forests develop naturally without the need for excessive preparation, as forest splits along angled hyper planes, resulting in increased precision.

G. XGBoost

XGBoost is a choice tree-based gradient boosting technique. Choice tree-based calculations are great for small to medium-sized organized/even data at the moment. This computation generates a series of choice trees. In XGBoost, loads are critical. All free variables are assigned weights and accounted for in the choice tree that predicts the results. The weight of incorrectly anticipated factors is increased and dispatched to the following choice tree. After that, individual classifiers/indicators are combined to form a more accurate model. This device can be used to address a predicting issue that is defined by the user.

4. IMPLEMENTATION

Business Understanding was required as the initial step in the construction of the paper, followed by data collection. This dataset was obtained from UCI Machine Learning (https://archive.ics.uci.edu/ml/datasets/default+of+credit+card+customers). It contains 300,000 records and 23 attributes. The depiction of attributes is shown in the image below.

LIMIT_BAL: Amount of given credit (Numerical)

SEX: Gender (Categorical)

EDUCATION: Education (Categorical)

MARRIAGE: Marital status (Categorical)

AGE: *Age in years* (Categorical)

PAY_0: Repayment status in September, 2005 (Numerical)

PAY_2: Repayment status in August, 2005 (Numerical)

PAY_3: Repayment status in July, 2005 (Numerical)

PAY_4: Repayment status in June, 2005 (Numerical)

PAY_5: Repayment status in May, 2005 (Numerical)

PAY_6: Repayment status in April, 2005 (Numerical)

BILL_AMT1: Amount of bill statement in September, 2005 (Numerical)

BILL_AMT2: Amount of bill statement in August, 2005 (Numerical)

BILL_AMT3: Amount of bill statement in July, 2005 (Numerical)

BILL_AMT4: Amount of bill statement in June, 2005 (Numerical)

BILL_AMT5: Amount of bill statement in May, 2005 (Numerical)

BILL_AMT6: Amount of bill statement in April, 2005 (Numerical)

PAY_AMT1: Amount of previous payment in September, 2005 (Numerical)

PAY_AMT2: Amount of previous payment in August, 2005 (Numerical)

PAY_AMT3: Amount of previous payment in July, 2005 (Numerical)

PAY_AMT4: Amount of previous payment in June, 2005 (Numerical)

PAY_AMT5: Amount of previous payment in May, 2005 (Numerical)

PAY_AMT6: Amount of previous payment in April, 2005 (Numerical)

Next was the data preprocessing or data cleaning stage. It entails removing invalid attributes, if present, omitting irrelevant sections, examining the information type for features, etc. We named the features according to our own understanding.

```
df.rename(columns = {"PAY_0": "September Repayment Status", "PAY_2": "August Repayment Status",
                     "PAY_3": "July Repayment Status", "PAY_4": "June Repayment Status",
                     "PAY_5": "May Repayment Status", "PAY_6": "April Repayment Status"}, inplace=True)

df.rename(columns = {"BILL_AMT1": "September bill statement", "BILL_AMT2": "August bill statement",
                     "BILL_AMT3": "July bill statement", "BILL_AMT4": "June bill statement", "BILL_AMT5": "May bill statement",
                     "BILL_AMT6": "April bill statement"}, inplace=True)

df.rename(columns = {"PAY_AMT1": "September previous Payment", "PAY_AMT2": "August previous Payment",
                     "PAY_AMT3": "July previous Payment", "PAY_AMT4": "June previous payment",
                     "PAY_AMT5": "May previous payment", "PAY_AMT6": "April previous payment",
                     "default.payment.next.month": "Default Payment"}, inplace=True)
```

Fig. 1: Image showing code for renaming of columns

There was an additional one class in section “0” of the marriage code, so it was eliminated. Education column also had one extra category “6”, this was also removed.

The dataset was represented as graphs to obtain additional information. This aided external comprehension of the information. Using heatmap, we additionally examined for correlated factors.

Labels		
Gender	**Defaulting status**	**Education**
1 – Male 2 – Female	0 – Non defaulted 1 – Defaulted	1 – Graduate school 2 – University 3 – High School 4 – Others 5 – Unknown

Table 1. Labels used for plotting the graph

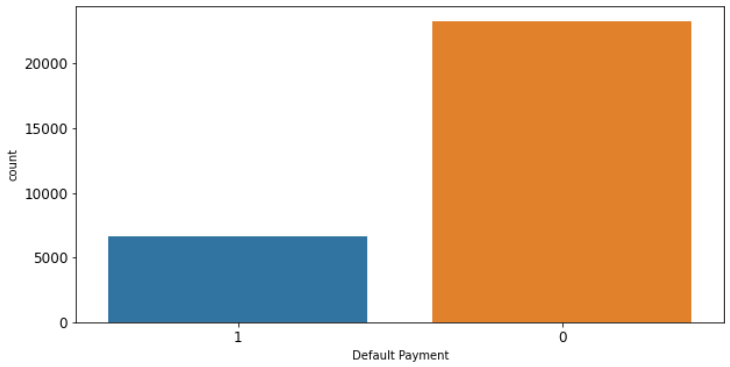

Fig. 1. Graph showing defaulted and non-defaulted accounts

From figure 1 we can infer that there are about 6500 accounts which have been defaulted.

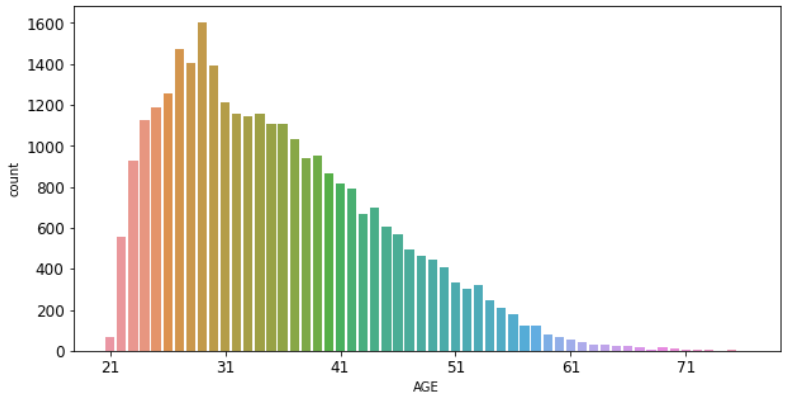

Fig. 2. Graph showing credit card users based on age

In figure 2 we can see that there is a large group of young population using credit cards. Most of the people who come under the influence of financial freedom are young people and it is easy to manipulate them to get any scheme. [26]

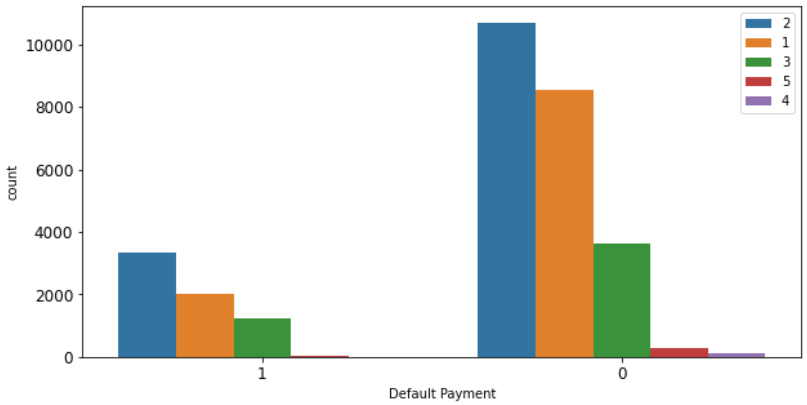

Fig 3. Graph showing defaulted and non-defaulted accounts based on education level

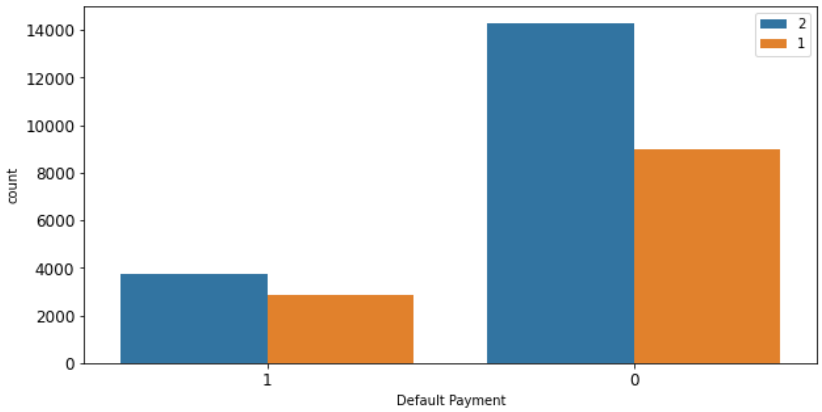

Fig. 3. Graph showing defaulted and non-defaulted accounts based on gender

Even though there are significantly more males than females using the credit card, we can see that gender does not matter much in the case of defaulted accounts.

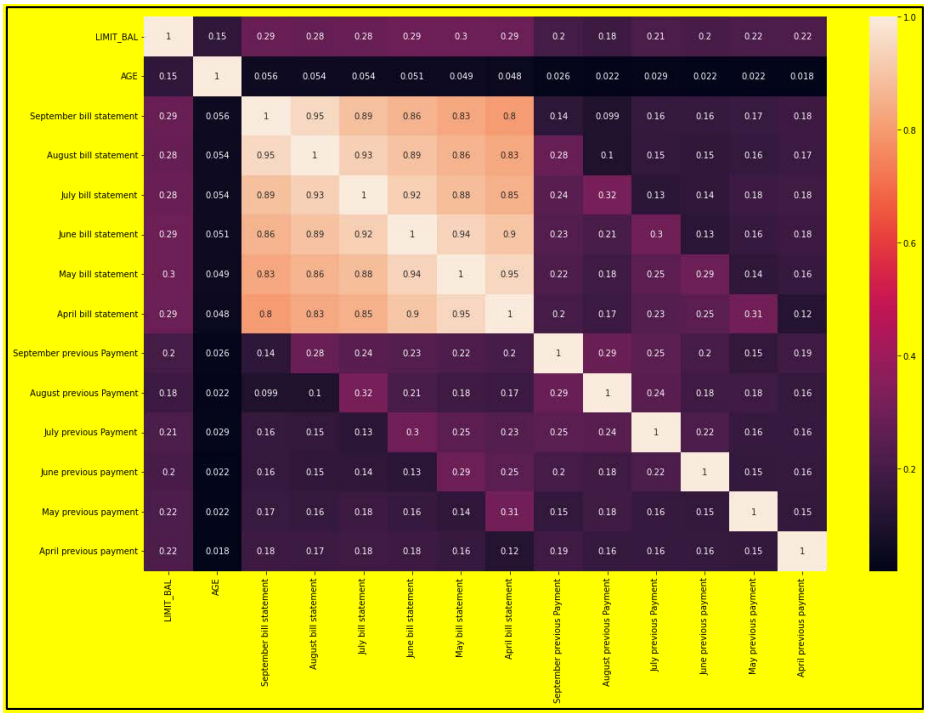

Fig. 4. Heatmap showing correlation between attributes

According to the illustrations, the majority of the segments were inclined. To counter this, the element section was scaled using a standard scaler. To modify the data, we utilized the SMOTE method. It was then divided into test and training sets, 20% and 80% respectively. We constructed models using the algorithmsmentioned earlier and reviewed the performance.

5. RESULTS

We one by one trained the model and evaluated the performance on the basis of accuracy. Different ML algorithms was used for determining which is giving the best result and Naïve bayes gave the best result.

Algorithm	Accuracy (%)	Precision (%)
Logistic Regression	80.84	79
K-Nearest Neighbor	75.55	75
Decision Tree	71.24	73
Naïve Bayes	80.87	79
SVC	80.84	79
Random Forest	72.54	73
XG Boost	80.14	78

Table 2. Table showing experimental results of each model used for prediction

From table 2 we can infer that LR, NB and SVC have similar accuracy and precision but, on the basis of numbers NB is the best performing model.

6. CONCLUSION

We utilized our data to assess the usefulness of various AI models for predicting its probability of a payment defaulting. To arrive at a specific result, we used precision as the deciding factor. We looked at Logistic Regression, KNN, Decision Tree, Naive Bayes, SVM, Ensemble technique, and XGBoost in this review. We concluded further that Naive Bayes model is the most appropriate model for forecasting the likelihood of a payment default.

Future research works may perform resampling on specific datasets. This contributes to decreasing the lopsidedness proportion of datasets, resulting in improved classification results. A model with a reasonable degree of precision and accuracy can be delivered as a web application or integrated into frameworks for the purpose of monitoring transactions.

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An Energy Efficient Clustering for Multilevel Wireless Networks using Dynamic Routing Discovery protocol

Aijaz Ahamed Sharief1, V. K. Sharma2

1Department of Electronics and communication Engineering.

Research Scholar, Bhagwant University.

Ajmer, Rajasthan, India.

Shariefwillbe@gmail.com

2Department of Electronic and communication Engineering.

Vice-chancellor /President, Bhagwant University , Ajmer, Rajasthan, India.

viren_krec@yahoo.com.

Abstract.

Due to multiple rising automated industry and combat field applications, researchers have developed a growing interest in the area of Wireless Sensor Networks (WSNs) over the previous decade. Extending the lifetime of the energy and the consumption of energy in WSNs are enormous challenges. One of the primary difficulties in WSNs is the development of energy-saving routing mechanisms. In recent days the security of the data collected is the main concern because of widely accessible wireless sensors, because these low-power devices are incompatible with complicated encryption methods. As a result, for multi-hop wireless sensor networks (WSNs) with non-replenish able energy resources, lifetime optimization and security are two opposing design concerns. This work introduces an Efficient Energy Clustering with Dynamic Routing Discovery protocol (EECDRD protocol), which addresses two competing difficulties by taking into account several characteristics such as probability random walking and the energy balance control mechanism. The suggested protocol detects that energy consumption in the existing network topology is disproportional to energy deployment, which has an impact on the lifetime of wireless sensor networks. Through a quantitative security analysis, this work proposes a non-uniform efficient deployment technique to handle existing energy resource optimization problems and addresses the security location privacy concern. In all circumstances, the proposed Protocol produces the efficient trade-off between the energy balance and the routing mechanisms, allowing sensor networks to last substantially longer. In addition, the deployment of energy in the non-uniform manner resultsin the increased network's lifetime and overall packets sent. The results of proposed work is compared with existing cost-aware routing protocols and outperform the existing protocol with respect to various performance parameters like energy, throughput and delivery ratio.

This is a sample input file. Comparing it with the output it generates can showyou how to produce a simple document of your own.

Keywords: Dynamic Routing Discovery, Wireless Sensor Networks, Energy Aware, protocol, Lifetime Optimization, Energy Consumption

1. INTRODUCTION

The Wireless Sensor Network (WSN) is made up of multiple sensors put in various geographic locations across several networks. Some of the unknown places where the size and energy of the network become crucial elements to decide are among the key applications

that use sensors. Due to their location and other obstacles, it is also impossible to replenish the energy of sensor nodes.

The increase of various networks and networking technologies has resulted in the development of innovative Wireless networks. These networks are comprised of various distributed networks that are mainly used to monitor the health of the sensor nodes based on the mobility, motion and the temperature. These networks acquired popularity in a variety of industries, and are today utilized in a variety of most popular applications such as automation of the home, monitoring the performance of various fields such as agriculture, robotic and health.

Wireless Sensor Networks (WSN) hasconsidered wired networks as the core area for the data of wired network security systems that require a minimum number of days and are pricey.Basic characteristics of wireless sensor networks are low utilization of the network, cost of the network and compact size of the sensor nodes, all of which may be defined by scaling down and combining.

These characteristics demonstrate that the wireless nodes have very much less control over the system complexity and the computation, helps in providing the necessity for the use of non-computationally verified applications.Thousands of physical address sensor nodes have been transformed, reduced in cost, and distributed in geological regions and for most applications thanks to advancements in wireless communication and hardware. Using a replacement battery to restore energy is tricky.

The Wireless Sensor Network (WSN) offers a greater range of audit visualization, editing concept development, automated audits, and agriculture awareness applications. By minimizing the size of the various multi-functional sensor nodes areused, the remote-moving hardware-capable devices and interchange design can increase the efficiency of the productivity. Most of the existing models today strive to identify proper path between source-sink to optimize the power capacity that enhances throughput.

In any event, if the idea of controlling energy expertise is implemented, the emergence of sensor networks will be doubled, because it does more than merely look for lesser energy path from source to the destinationof various sensor nodes. Modulation of the entire system's residual power distribution is also possible.

Even though there is various efficient energy routing protocols designed they failed to determine the shortest energy path between source and sink. In the proposed work an efficient dynamic routing protocol is designed to determine the shortest path from single source node to the destination without affecting the network power distribution.

This Main contribution of this work is to:

- To decide the appropriateness of secure routing conventions for wireless sensor networkarrangementswith regards to energy-efficient information dissemination techniques at multilevel networks for sensors organizations.
- To determine the problem of reducing energy consumption and increasing energy efficiency and to decide the ideal activity framework for the wireless sensor network base station.
- Provide higher network capacity and decrease the total energy consumption.

- Designing a new algorithm to enhance security and retrieve the information available at sink.

As discussion in the introduction section, the work presents an efficient energy clustering protocol at multilevel networks with Dynamic Routing Discovery protocol (EECDRD Protocol). In which each of the sensor nodes will maintain proper energy levels, As a result of this work two efficient algorithms have been proposed one for forwarding messages: shortest path and second for secure forwarding using random walk mechanism. The section 2 describes various research works done so far, Section 3 presents the proposed methodology and Section 4 describes the results and Discussion of the work carried out.

2. Literature Review

In this section we discuss on the various research works carried out so far in Wireless Sensor Networks on the cost-aware Secure Routing Protocol Design.

Di Tang et.al. [1] Presents how to monitor the surveillance network by combining multimodal sensor data. It primarily focuses on information procurement for multi-domain data acquisition. It also provides a plan for identifying needless and dangerous situations in the environment. This methodology helps streamline monitoring tasks in airports and other security-sensitive facilities because it is totally automated.

The author describes a method for acquiring essential data using information such as sound. The proposed framework for progressive preparation engineering recognizes a large number of preset patterns and discovers frequent practices.

Y. Li et.al [2] presents and evaluation mechanism of Multi Hop Wireless Networks utilizing Extremely Opportunistic Routing (ExOR). This ExOR sends the signal for each nodeusing node grouping technique, then this will accept the decision taken from each node for sorting the messages of all the nodes.

The proposed ExOR determines which of the evident bulk nodes that are effectively routed the ones are closest to the objective. The node closest to you communicates with the rest of the network using a suitable computation, the ExOR architecture tries to pick a sending node after transmission. Once the package is received by the node, this will remember for the parcel the basic workload representing the need request in which the possible recipients must advance the package. Based on common assessments of node transport rates, the node processes the schedule.

[3] Y. Li et.al discusses how to monitor and control capacity in Wireless Integrated Network Sensor for a variety of application used in the real time for various purposed such as healthcare, agriculture, safety, biological and security related aspects. The main drawback of this work they concentrated only on the power consumption of the sensor nodes.

The rapid expansion of integrated circuits has enabled the development of a wide number of complex technologies that connect the physical world to networks, as well as the increasing development of the low-cost sensor nodes and the processors. It will also extend from close to far, with applications ranging from medical to security to factory automation to environmental monitoring and condition-based support.

[4] B. Karp et.al examined statistics of most forward within range in One Dimensional Ad Hoc Networks (MFR). The analysis of a wireless network has revealed that routing-related characteristics have a significant impact on the network's performance. Power consumption, multi-hop communication delay, and position evaluation are all factors that influence routing designs. Statistical measures of the most forward within range routing network were investigated in this paper.

[5] Y. Xu et.al. discusses how to use QoS to achieve geographic optimal routing in wireless sensor networks in this work. One of the most important evaluations in the WSN is QoS routing. Most vital monitoring and surveillance systems rely on fast data delivery as one of the most important aspects. In the case of geographic opportunistic routing (GOR) for QoS provisioning in WSNs with both start-to-finish dependability and delay constraints.

WSN-designed robust QoS Awareness GOR protocol optimized for performance latency WSNs to optimize QoS EQGOR, effectively pick and priorities preset forwarding candidates. The amount of energy used and the length of time it takes are two factors to consider. In a WSN, using a multipath guiding technique to ensure reliability and latency QoS restrictions may be impractical.

[7] N. Bulusu et.al discusses real-time implementations of the harmonization protocol-based clustering to create energy-efficient wireless sensor networks. WSN employs optimization techniques to aid in the creation of a centralized cluster-based protocol. For many real-time applications, the harmony search algorithm (HAS) is employed in WSN. In WSNs, it's crucial to keep intra-cluster spacing between cluster heads (CH) and group individuals to a minimum and to maximize energy distribution.

Through many works carried out based on the Energy-Balanced Routing Protocol (EBRP) they fail to provide much efficient and proper routing strategies, Hence our research work aims to address these issues. This research works an efficient energy clustering protocol at multilevel networks with Dynamic Routing Discovery protocol (EECDRD Protocol by addressing various issues found in the literature review.

3. Proposed Model

This work presents an efficient energy clustering protocol at multilevel networks with Dynamic Routing Discovery protocol (EECDRD Protocol is mainly designed on a power rating model to control power measurement and route safety at WSN at the same time. Each sensor is required to maintain grid power levels in its immediate vicinity. This function focuses on two messaging system systems: the shortest route and secure sending using random navigation.The main aim this work is to

- Reduce the energy consumption among the various sensor nodes.
- Increase proportion of message conveyance
- Minimize the time delay.
- Improve the security among the nodes

3.21The System Architecture

The architectural design in Figure 3.1 depicts the proposed Framework for common mobility data in terms of one –Dimensional line process where the sensor node is sent to the path, without use of any other force, and depicted the same in the standard development framework.

Without the use of administrative force, the majority of the present standard development data collecting framework was completed. With the demands for numerous advancements that are acceptable in the city of understanding, the cost-effective upgrade solution for obtaining intelligent movement data should be explored.

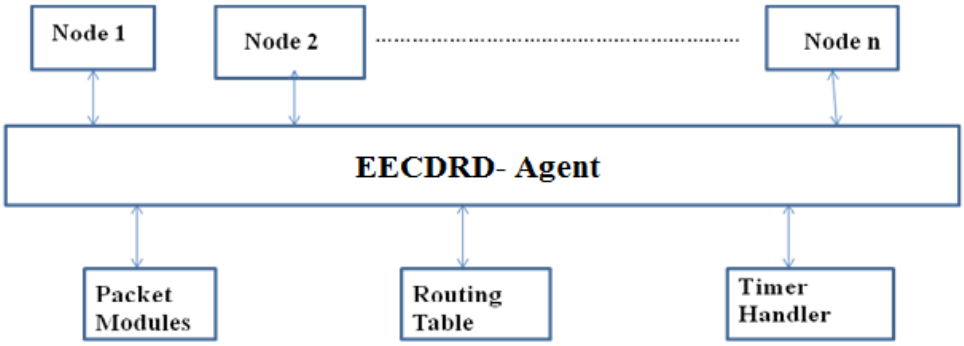

Figure 3.1: System architecture for Proposed EECDRD Protocol

The node of the sensor will provide the data collected to transfer of the node and delivers to sink node. One or more jumps out, and the sync node eventually generates and sends full development data to the motion management focus. In a WSN-based information technology (IT) framework, great versatility can be leveraged to extend the life of a 1-D line system that demands energy savings.

3.3 Energy Balance Control

In the proposed EECDRD protocol, each node's energy level is used to pick surrounding nodes. To balance the energy and consumption of additional energy by the nodes at various levels, the grid with high energy levels is used for message forwarding. The degree of energy balance control is enforced as criteria to accomplish balanced energy balance control.

In WSNs, raising the energy of the main node increases the routing length, which can efficiently regulate the energy consumption of each node by lowering the energy levels below Node B.

For node B, the set of all surrounding grids is defined as, and the grid I's remaining available energy is specified as, I Nb. The following is how the EECDRD selection path algorithm works:

$$\in_{\infty} = \frac{1}{Nb} \sum_{i=Nb} \in ri \text{-------- (1)}$$

The energy level of each node is used to select neighboring nodes in the proposed EECDRD protocol. The grid with high energy levels is utilized for message forwarding to balance the energy and consumption of more energy by the nodes at different levels. To achieve balanced energy balance control, the degree of energy balance control is enforced as a parameter.

It was also demonstrated in WSNs that increasing the energy of the main node increases the length of the route and manages the energy consumption in an effective manner, each node by lowering the energy levels below Node B.

For node B, the set of all surrounding grids is defined as, and the grid I's remaining available energy is specified as, I Nb. The following is how the EECDRD selection path algorithm works:

3.4 Secure Routing Strategy

The proposal demonstrates the information transmitted by the steering system. When steering, this is a directing approach that can provide both quirkiness and security. The steering path is less predictable than anticipated. The two-message protocol follows to different options: first is based on framework determination, and second is arbitrary matrix based. The relative areas of the grids determine the next node in the deterministic steering technique. Messages are forwarded to nearest grid. The next hop grid for message forwarding is chosen at random under the safe steering circumstance.

Each communication includes a security level of [0, 1], which regulates the spread of these two calculations. Wherever the sensor node wants to send a communication message it will choose an arbitrary from [0 to1] as the initial path, then it will choose the next hop using the shortest path technique.

The computation of this method is mostly determined by the security level [0, 1], which defines how each communication is conveyed. Whenever the node want to communicate it starts with the arbitrary value [0,1]. If > is true, each node decides the hop grid based on the path routing protocol; otherwise, a random algorithm is mainly used to chose the grid of next hop.

3.5 EECDRD Algorithm

EECDRD algorithm includes routing routing security. Safety routing increases the cost of extra routing due to the extended routing route.

The Algorithm is follows:

Step 1: Start
Step 2: At source node, create DATA packets:

Given the value of 'alpha'

Set the value of 'beta' for every node:

Calculate threshold Energy = alpha * average Energy;

Step 3: Chose a random number for the value of 'gamma'

if (gamma > beta) then

Select a grid whose RT.i.averageEnergy is more and greater than threshold energy

Select a shortest node to the sink node from selected grid

Send the packet to the selected node.

else

Choose a random node from the neighbor node set and send to it.

End

The likelihood of the next framework hop to glance over an irregular walk increased as b increased. As a result, the steering path is more erratic. Particularly when b value is less than alpha value an Irregular walk becomes the primary directing mechanism for the next bounce network to be chosen. Because EECDRD blends irregular walks with shortest routing, existing research [19], [20] suggests that messages may not be transmitted when the base b=1 wherever the data is transmitted from source to destination.

Messages will be forwarded from the source node to the sync node if the shortest routing is defined. Regardless, the steering approach will be more strong and unconventional. Along these lines, it is becoming increasingly difficult for an adversary to intercept a message or generate a traffic congestion. As a result, in dangerous situations, the conveyance proportion can be increased. Course separation is increased with the security level b while providing directing wellbeing.

4. Performance Analysis

Network Simulator 2 [ns-2] is used to perform the performance analysis. The GNU plot utility is used to plot the results.

4.1 Energy of the Network

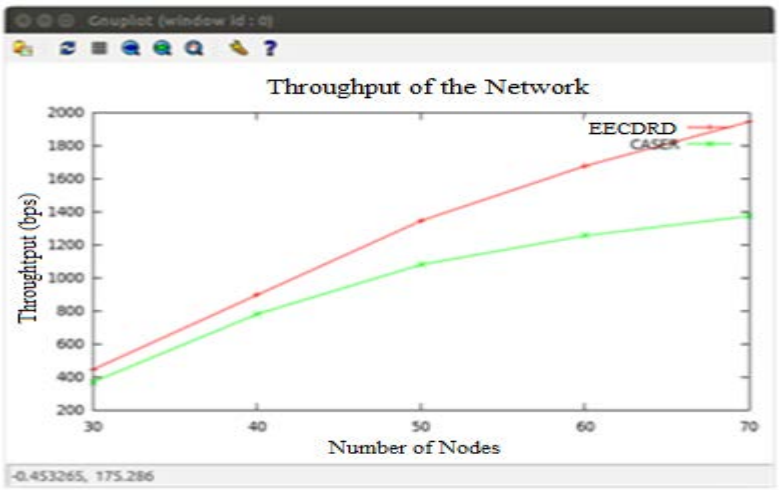

Figure 4.1: Number of nodes vs. Throughput

The graph in Fig. 4.1 is plotted using the results of the network's energy in relation to the number of nodes.

The results are compared to those obtained using the CASER technique [1]. When compared to CASER, where a neighbour node selection strategy is used, the suggested protocol saves energy by adding more number of nodes for the transmission, which adds to the network's overhead.

Figure 4.2 Number of nodes vs. PDR

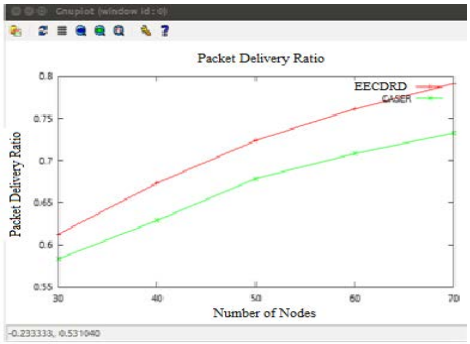

Figure 4.2 describes the number of nodes vs. PDR, where the PDR is the ratio of various number of packets received from the sink to source node. The results of the packet delivery ratio vs. the number of nodes are shown in Figure 4.2. The results describes the proposed protocol has more PDR than the CASER because routing ensures that packets arrive at their destination. If the channel is busy, the proposed protocol uses internal queue management to store packets to be transmitted later. As a result, delivery outcomes will be improved.

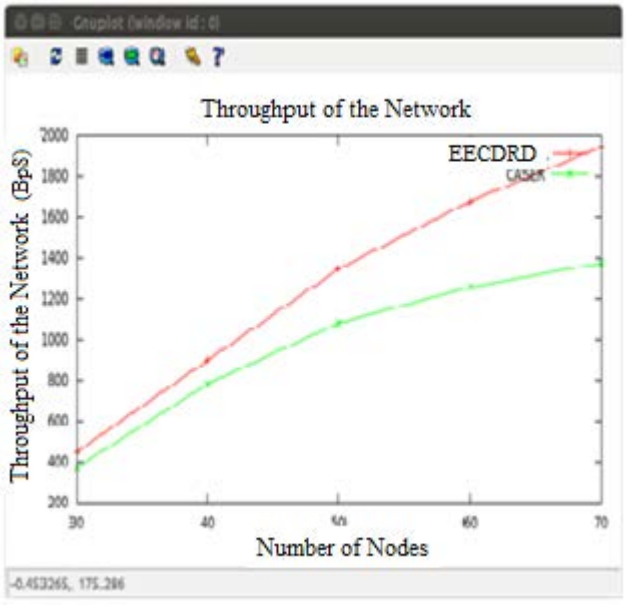

Fig 4.3 Throughput v/s Number of nodes

Fig 4.3 shows the consequences of throughput v/s number of nodes within the organization.

Due to the energy efficiency and unpredictability produced by introducing security, better packet delivery is achieved as adversaries are unable to manipulate the data. As a result, when compared to the CASER methodology, the results reveal improved performance.

6. Conclusion

This work presents an efficient energy clustering protocol at multilevel networks with Dynamic Routing Discovery protocol EECDRD Protocol for WSNs that balances energy usage in a non-uniform energy deployment manner to increase the network's lifespan. Multiple routing is possible using the proposed protocol's message forwarding mechanism, which extends the packet's lifespan and enhances security. According to theoretical analysis and simulation results, the proposed EECDRD has a good routing performance in terms of packet delivery ratio, throughput, routing path security and energy balancing. In the future, this work could be developed to compare with the current Leech protocol in order to improve network node performance characteristics.

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Radical Sound Valuation of Fetal Weight with Pregnancies Convoluted by Gestational Diabetes

[1]Prof. Keerthana P, [2]Dr. Sasidhar Babu Suvanam

Authors affiliation, [1]keerthana.P@reva.edu.in,
[2]sasidharbabu.suvanam@reva.edu.in

Abstract.

This research aims to highlight the importance of radar in infants affected by impaired glucose tolerance. It will focus on Prediabetes impact on pregnancy, as well as the use of imaging techniques to calculate the quantity of the foetus and most appropriate transport approach. It will also reveal information about how this advancement may be used to understand the pathogenesis of this disease. In an ideal world, you'd work on the maternal-fetal result.

Keywords. Ultrasonography; Diabetes, gestational; Fetal weight

1. INTRODUCTION

Diabetes is one of the most well-known contaminants that, if not treated promptly, can have disastrous consequences, particularly during pregnancy Wier et al. estimated that that diabetic nephropathy affects about 6% of preterm births. During maternity, an expansion in the beta cell of the pancreatic causes an increase in insulin in the fasting and subsequent stages; nevertheless, the uterus secreted designed chemicals that reduce glucose blockage in the third trimester. As a result, hyperglycemia is a sugar intolerance condition in which beta cells are unable to compensate for diabetes during pregnancy. This condition can jeopardize the maternal-fetal outcome while also adding to the costs of pregnancy. Women, fetal outcome while also adding to the costs of pregnancy. Those who have previously been diagnosed with GDM have a higher chance of surviving Pregnancy and, surprisingly, the onset of prediabetes. According to the American Clinical Practice Guidelines, GDM health checks should be performed using a 50-ounce noneating lactose tolerance test after 24 weeks of pregnancy (threshold B evidence), whereas women at risk of developing the condition (family history of hyperglycemia, character, and high blood pressure) should be evaluated at the critical time during pregnancy. In patients with positive screening (>130-140mg/dL), glucose concentrations versatility testing (Fpg), a kilogram's calorie restriction eating examination, is utilized to diagnose 7 GDM. Another method of screening is a 75 g 2-hour calorie restriction OGTT. Because of the potential for

a large number of snafus, Ultrasonography has been utilized to assist the organization of GDM, which can range from hypertension to foetal advancement alterations. The goal of this review is to comprehend the importance of radiology and its involvement in the acquisition and direction of Prediabetes.

In pregnancies obscured by GDM, ultrasonography can be used to:

- Screen fetal turn of events and predict measured fetal weight.
- Distinguish between natural and man-made anomalies.
- During the early stages of pregnancy, check for placental alterations and expect GDM.
- Select a mode of transportation to avoid p

Fig 1: 2D Fetal Ultrasound

2. METHODS

2.1 Work on Examining the Fetal Turn of Events

Clinical practice has shown the use of radiography in disease fetuses may change. In fact, the American Institute for Health and Care suggests that medical professionals start prenatal perception at week 32 of pregnancy in women who need therapeutic intervention for Prediabetes or who have uncontrolled Impaired glucose tolerance. In any event, this shift in timing causes internal awareness of obvious factors that can work against a terrible delivery outcome. The American College of Obstetricians and Gynecologists has

campaigned for prenatal IVF (ACOG). Improvement according to the near as a visual representation of practice in 2013. "Twice step by step non-stress tests or a significant number of weeks modified biophysical profiles starting 32-34 weeks of improvement" can be consolidated with "follow-up."

Fetal macrosomia is usually one of the most dreaded complications. In the undeveloped organism, there occurs a state of induced hyperinsulinemia. In girls with GDM, Foetal widespread distribution is defined as a fetal load of around 4000 g10 and an average weight above the 90th percentile. It's linked to an increased risk of obstetric difficulties in the elbow, upper extremity injuries, and pericardial injury. As a result, experts are needed. Starting at 32-34 weeks after hatching, sonographically monitor foetal improvement. Due to a lack of massive exams that couple rapid foetal improvement with recurrence of monstrous for gestational age youngsters, an extreme associate for the standard perception in pregnancies tangled by GDM isn't open (LGA). The head limit, biparietal distance across, stomach outskirts, and femur length are the most often used limitations to determine foetal weight. Additionally, in diabetes-affected pregnancies, the distinction between assessed foetal weight and true weight is augmented. The last option has a negative impact on the hatchling's fat movement, most typically affecting the stomach girth. Scifres et al. discovered in a study sidekick concentrate that among women having ultrasonography findings, only 56 of the 248 LGA underdeveloped organisms (22.6 percent) carried LGA neonates. As a result, it was discovered that ultrasonography in general misinterpreted Prediabetes perplexes in infants. Additionally, it was observed that conclusion was linked to prolonged caesarean motions, regardless of the true foetal weight.

Disease is characterized newborns for an unmatched infant birth weight assessment in following pregnancies to forecast foetal birth weight in Disease is characterized infants for an unmatched infant birth weight assessment. There were 271 pregnant women in the study, 147 of whom had GDM and 124 of whom did not. The pulse pressure (S/D) degree, real exploration lists, inspiratory recorded (PI) of the uterine assistance, concentrate cognitive channel, and kidneys limitation were all used in this investigation. Wideband radiology is combined with other approaches in this programmed. The rundowns inside the two female's ethical behavior got analyzed at a normal prenatal age of 38 weeks, and they were shown to be undeniably massive (P0.05). Because they had more significant UA, pregnant women with Prediabetes had smaller UA and MCA reports than the usual control group. Furthermore, it indicates that UA and MCA have a negative link with low birthweight, skull loop, and abdominal lines, as well as MCA records of renal passage. This demonstrates how useful these data can be in determining gestational age and preventing macrosomia-related complications.

In addition, FLL was compared to the delayed Oral glucose tolerance test response at 24 weeks of pregnancy in a well-organized study that included 331 pregnant women who had their foetal kidney thickness measured using radiology around 23 weeks of pregnancy and then evaluated using 10g of Oral glucose tolerance test. As a result, it’s proposed that FLL could have been used to detect gestational diabetes in high-risk women. In any case, because follow-up is one of the survey's flaws, the ideal period to forecast mellitus risk is presently unknown. As a result, it's reasonable to conclude that the primary use of ultrasonography in assessing foetal weight is to rule out the occurrence of macrosomia, which can assist rule out maternal causes. Snare drums are a type of percussion instrument.

During the delivery process, it was used. Regardless of the certifiable weight, ultrasonography, a method of therapeutic imaging that employs sound waves to finish foetal macrosomia, can greatly raise the likelihood of unnecessary caesarean transfers and work discrepancies. On this premise, echocardiogram foetal weight surveys do not lead to the selection of a method of mobility. To arrive at a decision on how to restrict the movement and monitor foetal recovery, a complete clinical evaluation of the pelvic development is required, as well as early risk factors for macrosomia despite echocardiography observations.

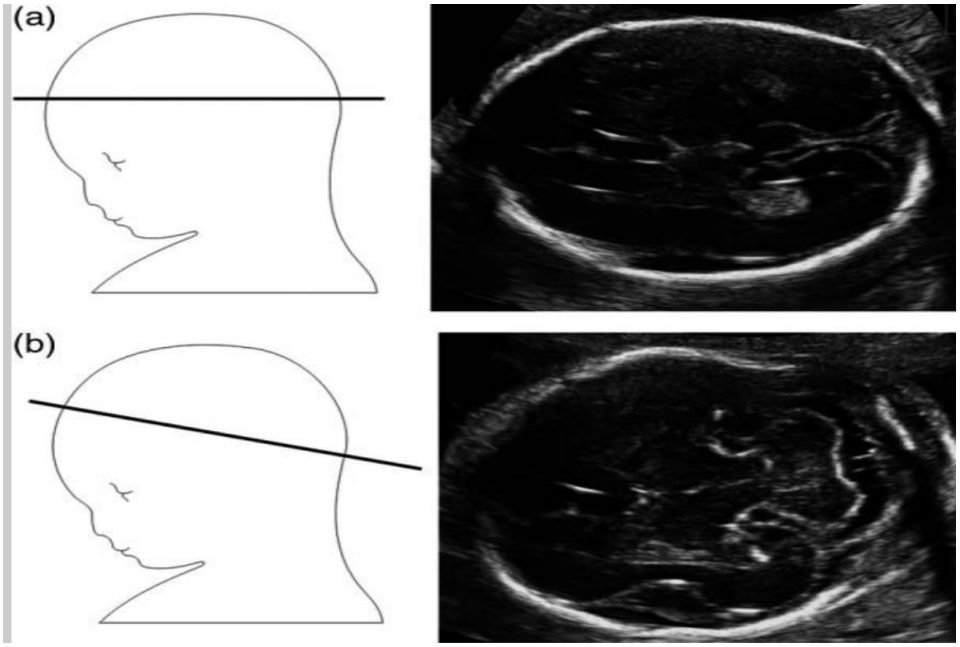

Fig 2: Schematic and representative ultrasound images for Monitoring placental changes

2.2 Identifying Inextricable Abnormalities

It's worth mentioning because presentational hyperglycemia (PGDM) has been connected to a variety of inborn disorders. It was discovered that the prevalence of massive apparent anomalies in diabetes pregnancies grew from 6% to 10%. GDM and PGDM, on the other hand, were connected to broadened main inborn adjustments in a meta-analysis of 21 accomplice evaluations. Women with gestational diabetes mellitus have a slightly higher chance of frequent abnormalities, and those with PGDM have a significantly higher risk. GDM can damage any structure, albeit the signs that affect the cardiovascular and physical frameworks are the most well-known. Ultrasonography can be used after 11-14 weeks to confirm a couple of regular changes of development. Between 20 and 22 weeks of pregnancy, a variety of alterations may appear. When it comes to a more precise examination, new important level imaging innovations, including as cellular consonant imaging and distributed cardiac, outperform standard radar. Professionals can also use fetal

ultrasonography to see if pharmacologic treatment will be beneficial in managing maternal hyperglycemia.

Normal heart anomalies represent a large portion of all maternal and infant mortality as well as horror. Natural cardiac disorders have an openness rate that varies from 35 to 86 percent. This rate is due to improved heart health and the involved in getting reliable points of perspective. Various methodologies exist for detecting various cardiovascular congenital defects. One of the techniques for evaluating inborn oddities is the four-chamber view. Despite this, Chaoui believes that four-chamber vision radiology is ineffective at detecting pre-birth irregularities and can be used to ignore them. His advocated that foetal echocardiography be used to improve accuracy, particularly when checking for overflowing plot problems. Albert and colleagues agreed, suggesting that embryonic Doppler was more precise than multiple sonar in detecting circulatory problems. view ultrasonography (92%) versus 33%). 20 Three-layered besides, four-layered based spatial-short lived imaging association in foetal echocardiography, which relies on making good to enable for the evaluation of the quantity of the foetal from the four-chamber perspective to the right atrium pulmonary arterial loop and overflowing, is another strategy that can be used to recognize characteristic heart inconsistency. 19,30 Despite the overflowing plot inspection, Devours et al. discovered that only 13.7 percent of heart failures were recognized in 92,000 completed pregnancies. Anencephaly and caudal backslide condition are the most prominent associations with mind tube occlusions, which will surely than among (2/1000), happen in mellitus gestation (recurrence of 20/1000). These anomalies are usually identified precisely at each stage of pregnancy. More research is needed to understand the direct association between PGDM and inborn foetal abnormalities, as well as the influence of hyperglycemia on foetal embryopathy. In any event, ultrasonography has the potential to detect these problems early and, as a result, influence the path of the tangled pregnancy.

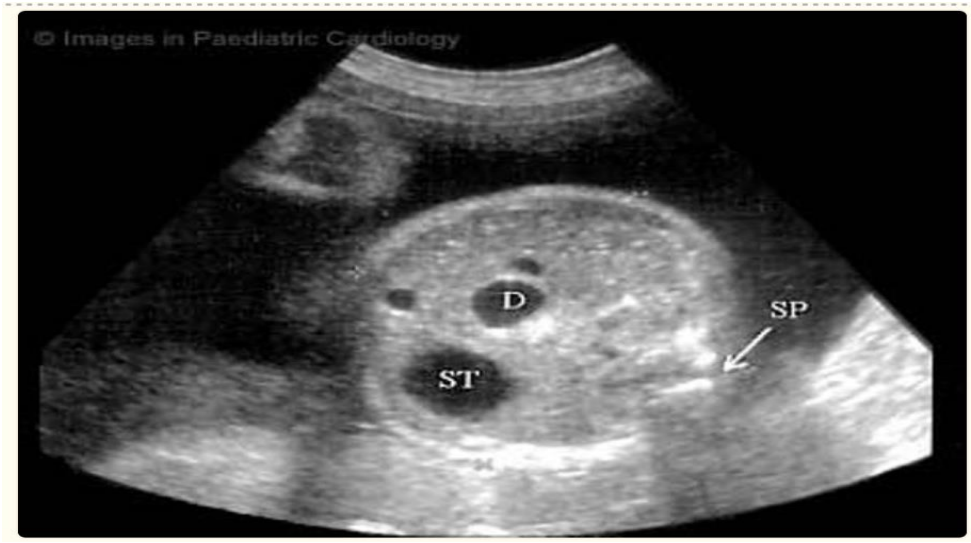

Fig 3: Duodenal atresia at 28 weeks of gestational age. Transverse scan of the abdomen (ST, stomach; D, dilatated duodenal bulb; SP, fetal spine)

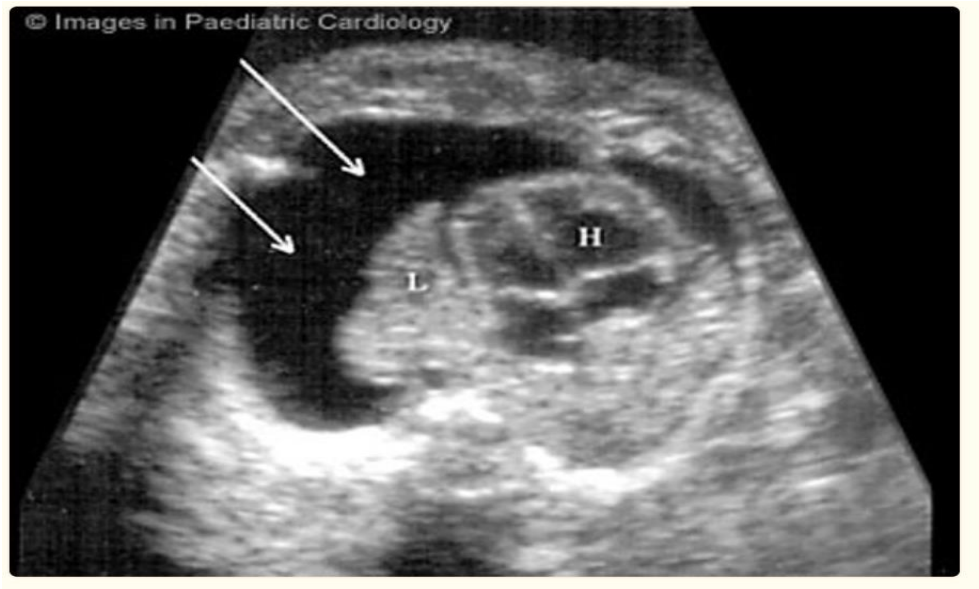

Fig 4: Cross section of a fetal thorax with hydrothorax (arrows); L, lung; H, heart

2.3 Taking a Close Look at Placental Alterations

GDM is considered to be linked to either an elevated risk of maternal or foetal complications. Similarly, alterations in the placenta during pregnancy can indicate potential complications. The volume of the uterus was discovered to be associated to situation control research involving 39 singleton pregnancies. Furthermore, in GDM-affected pregnancies, the placental volume increases significantly. Regardless, the small model size is a significant disadvantage of this study. In contrast to conventional wisdom, small case-control research involving women found a link increased terminal villous volume along the length of the arteries was linked to pregnancy complications, but there was no effect on placental volume. This objective maintains the possibility of trophoblastic improved performance. We are seriously concerned about the strength of a pregnant course. According to Edu et al., the expanded placental the thickness of the placenta on sonogram between stages 24-28 of development can also be used to anticipate and confirm some need to assess for Prediabetes, regardless of how other maternal characteristics may influence the placental changes that occur. A much later planned control study of 155 women looked at changes in circulatory records during the first and second trimester of pregnancy in Disease is characterized pregnancies and gave more information about the use of imaging to analyses perinatal alterations.

It is considered that determining placental vascular records using Doppler ultrasonography at each stage pregnancies (first trimester) can truly provide a glimpse into the prospect of

making a decision the robustness of a pregnant course is a major concern for us. As proposed by Edu et al., the expanded placental size on sonogram between weeks 24-28.

During the first and second stages of pregnancy, placental vascular records have been discovered using Scanning software for Simulated Tissue Laptop Diagnosis, including vascularization list (VI), stream document, as well as either along stream list not withstanding uterus path and fetal quantity. The audit found that alterations in VI and VFI occur before clinical findings in the first and second trimesters. It was discovered that, unlike FI and uterine PI, which did not differ from controls, VI and VFI During that time of pregnancy, individuals with GDM had significantly lower levels of insulin. Desoye et al. support this goal, proposing that the growth decay factor alfa causes vasoconstriction, which results in a drop in VI and VFI. FI, on the other hand, is mostly unchanged between the two social occasions since it measures the power of the flow rather than the amount of vascularization.

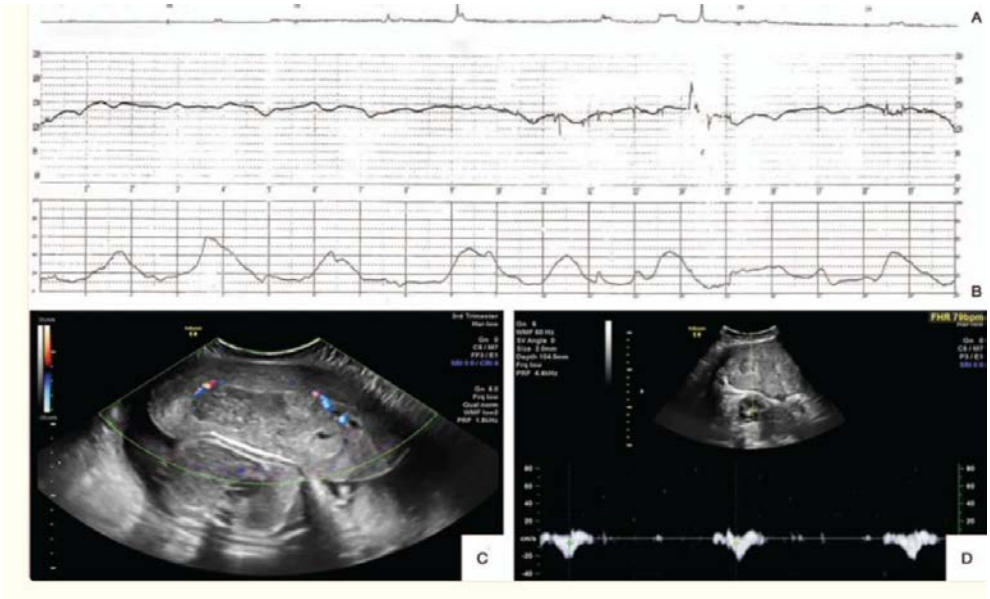

Fig 5: Monitoring placental changes

3. RESULTS

Completing Gestational diabetes mellitus and controlling the situation properly can lower the risk of prenatal issues. Fetal hyperinsulinism occurs when glucose from a mother with GDM is transferred to the hatchling, contributing to foetal congenital malformations. Despite this proposed pathogenesis, a study of 1344 women with GDM indicated that pregnancies complicated by gestational diabetes resulted in minimally increased birth weight (1.1%). Despite the increased likelihood of caesarean deliveries, foetal macrosomia increase the danger of foetal passage and maternal labor and delivery ensnarement's like

injury during transfer, shoulder dystocia, and hypoxia with inconvenient transport. Echocardiography has been shown to be useful in assessing foetal development and thus maternal outcomes established tended to, while also need more progress in order to perceive the LGA foetus.

An ultrasound-based fetal mobility assessment was found to be highly connected to the chance of caesarean delivery weight in pregnancies without GDM. The impact of ultra-sonographic assurance on GDM in confused pregnancies, on the other hand. The moving strategy is still a mess. Little et al. focused on women with ultrasound-surveyed fetal weight that was 44% near 1month before movement in a friend's audit. A caesarean section will be delivered.

This was supported by a later audit accessory review led by Scifres et al., which found that ultrasonography was linked to an increased risk for caesarean transports unrelated to birth weight [odds extent (OR): 3.13, conviction length (CI): 2.10-4.67 with P <0.001] even after controlling for potentially confusing factors such as weight record, arrangement, race, hypertensive issues of pregnancy, steady hypertensive issues, and steady hypertensive issues Ultrasonography can misread foetal weight, resulting in the improperly requested LGA hatchling being considered. The use of ultrasonography to investigate LGA was linked to a greater likelihood of caesarean delivery. "Ultrasound evaluation of foetal load near term shows a modifiable responsibility element that specialists can target," the researchers write.

The completion of LGA with ultrasonography was linked to a significantly increased risk of caesarean delivery. As a result, "ultrasound foetal weight near term infers a modifiable risk factor that specialists can address," according to the study. Cesarean transports have increased in frequency during the last few years, reaching 32.3% of people are unemployed. It should be emphasized, however, that echocardiography can misread reported foetal burden by as much as 10%.

Among the most feared consequences of preterm birth is shoulder dystocia hatchlings, and it can affect up to 10% of diabetes women has recently demonstrated the greater rates of shoulder dystocia prevalent in underdeveloped countries. The upside-down fat redistribution in these infants can be attributed to the organisms of diabetes moms. According to an upcoming Hypoglycemic pregnant woman with echocardiogram foetal weights of more than 4.25 kg or beyond the percentile but much less than 4.25 kg at 37-38 extended lengths of brooding underwent recognition of work or elective caesarean transfer, according to Conway et al. There was a reduction in the likelihood of shoulder obstetric complications when these sonographic shorts were being used as a reason for selective delivery. Shoulder dystocia can, however, occur in children weighing <4000 grimes at birth, demonstrating that ultrasonography does not always detect those who are at risk for this issue. As a result, ultrasonography is being used as a technique for preventing problems. As a result, the efficacy of sonar to prevent issues such as joint uterine prolapse is still disputed, particularly given the misinterpretation of foetal burden in computed tomography examinations.

Prospect evaluations are predicted to classify Disease is characterized pregnancies as usually macrosomia-free. While pregnancies obfuscated with LGA will be subjected to routine ultrasonographic monitoring, which will coordinate minor actions to counteract the benefit. Until then, appropriate patient guidance has been advocated regarding over identifying lower birth weight or LGA in Disease is characterized fetuses, as well as the elevated risk of c - section and certain parental pathologies that come with it.

4. CONCLUSIONS

Over last ten years, Malnutrition has become more widespread. Majority of GDM screening is focused on I t takes roughly 24 weeks to incubate, and it's critical to do so the illness in order to avoid any maternal-fetal problems Ultrasonography's role in patient observation. It's still debatable with GDM. It gives doctors the ability to determine the weight and development of the foetus, which can provide doctors' ability to choose the best method for acceptance or caesarean delivery are both acceptable methods of delivery. Keeping Ultrasonography has the potential to overestimate the foetal heart rate. Weight and could make you more vulnerable to delivery in People should really be made aware of potential options present and future pregnancies.

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The Evolution Of Robotics Research

[1]R. Jeeva, [2]V. Lakshmi, [3]S. Geetharani, [4]S. Ranichandra

Department of computer Science, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Email: jeevar87596@gmail.com (**R.Jeeva***) Corresponding author:* R.Jeeva

Abstract:- During the past half-century, robotics research has evolved in response to the growth of human social demands, from industrial robotics that freed humans from harmful or risky activities to the current boom of field and service robots to aid humans. This article traces this trend. Industrial robotics and mobile robotics are examined in this article, as well as emerging trends in robotics research that concentrate more on the human-robot interaction.

Key Words:- Application of robots, Mobile Robots, Walking Robots.

I. INTRODUCTION

Recent 45 years of advanced mechanics study have been devoted to solving the specific problems of applied mechanical technology by finding solutions. Exam topics in mechanical technology have been impacted by changing application sectors and increasing complexity. Human needs have smothered this advancement. As a result of the contemporary upheaval, the processing factory used modern robotics in the 1960s to free up the human administrator from dangerous and damaging tasks. We are now seeing a rise in the need for field and administrative robots to meet new market and human social needs as a result of the growing environment we live in [1]-[5].

When it came to monitoring the evolution of exploration, providing an inventory of each investigation subject in a particularly vast territory would have been impossible for the game's designers. As a result, these authors would want to express their apologies to anybody who feel that their work has been overlooked in this overview. Precluded topics aren't considered less significant, but they are used less often in the real world of advanced mechanics, which is the implication here. There are three distinct areas of mechanical technology that are covered in this article: robot controllers, portable robotic devices and organically stirred robots. They may have some common elements, but these three areas are essentially different in their research and application domains. Because of this, they have been treated separately in this review [6]-[10].

It is a sequential chain of rigid appendages designed to carry out a task with its end effecter, referred to as a robot arm. Modern controllers were employed in the early stages of the project in order to carry out tasks such as welding, painting and palletizing. There has been a steady rise in new applications, such as medical procedure assistance, restoration, and so on because to society's specific needs and technological advancements. This section focuses on those areas that have received special attention, such as contemporary robots, clinical robots, and recovery robots, in particular[11]-[12].

Robots were originally introduced in the creative process in the 1960s, and until the 1990s they dominated sophisticated mechanical research. At the beginning, the automotive industry influenced the specifics of contemporary robots because of its market clout and well defined needs. During that time, it's not clear which areas of inspection were the most crowded. Kinematic adjustment, for example, is a crucial interaction because of the incorrectness of kinematic models that are reliant on assembly boundaries.. There are four stages of adjustment interaction. The DenavitHartenberg (DH) approach and the POE definition lead a large set of numerical modelling techniques in the first step. Kinematic presenting fundamentals may be found in a detailed discussion. In the second step, sensors are used to directly estimate the difference between a model's theoretical model and its actual model. A robot's final state is not fixed in stone, and the limits that change from their apparent attributes are detected in the third stage via improvement tactics.

Movement arranging is another important area of investigation, in which sub-goals are developed in order to govern the robot's mission. You will find two different sorts of math in the text: specific tactics and unambiguous procedures. The robot's distinctive behaviour is determined through a set of procedures. The potential field calculation is one reliable plan that appeals from a computational point of view. This approach has certain drawbacks, such as the fact that the robot might become stuck in the vicinity of the potential field capacity's neighbourhood minimums. Expressed tactics that facilitate the direction of the robot between the underlying and final goal. However, open-circle control principles are at the core of consistent, unambiguous approaches. Ideal control approaches, which have a number of limitations, including a high computational cost and a strong dependence on the robot's dynamic model.

Modern robots were compelled to adapt around 1990, with flexibility being the most important characteristic. In the food and medicine store businesses, the latest robots were seen in action. Mechanical frameworks for automating postal coordination were a frequent target of postal administrations. The ability to adapt to the item and the environment became a problem in the following lines of investigation in the area of current sophisticated mechanics because of the primary necessity of being able to compel variety in item, size, form, and unbending nature (due to food sources). Currently, the focus is on ensuring that the framework for monitoring and evaluating performance has the necessary insight and critical thinking capabilities. This is done by using computational reasoning processes. In order for the robot to be able to function in a variety of environments, a

variety of artificial intelligence (AI) techniques are used. Those strategies fit into three areas of human consciousness: learning, thinking, and critical thinking. Inductive learning is the most often used method of learning in mechanical technology, in which the robot learns from pre-selected models of its own. Mechanical technology employs a wide range of thinking styles, including spatial thinking, transitory thinking, and fluffy thinking. For critical thinking in mechanical technology, the most often used tactics are heuristic looking, the blackboard model, and implied end thinking.

II. MEDICAL ROBOTS

Robots have recently made inroads into the medical industry, although not to replace skilled staff like experts and attendants, but rather to assist them with clerical tasks and ensure correctness. It was in the 1990s when clinical advanced mechanics really took off. Many therapeutic uses have emerged since: lab robots and tele-medical procedure; meticulous preparation; remote medical procedures; telemedicine and telediscussion; recuperation; assistance for the deaf and visually impaired; and medical clinic robots, among others. Clinical robots assist in the treatment of victims of cardiovascular failure and allow for prosthetic limbs to be finely adjusted down to the millimetre. Advanced mechanics in the medical industry, however, face significant challenges, mainly because to concerns about safety, precision, expense, and reluctance to accept this new technology.

In addition to controller plan (e.g. kinematics, incitation), level of independence (e.g. prearranged versus tele-activity versus obliged helpful control), designated life structures or procedure (e.g. heart, intravascular, percutaneous, laparoscopic), planned working climate (e.g. in-scanner, regular working room), and so on, medical robots can be classified in a variety of ways. For example: The area of meticulous advanced mechanics, where a great deal of effort has been put in, remains available for further study. Repetition, avoiding excessive speed or force in actuators, rigorous plan evaluation, and varied crisis stop and designated spot/restart offices are some of the important specific obstacles to overcome. Additionally, clinical human-machine interfaces relies on the same technological breakthroughs as other applications. As a result of the limited scope of today's camcorders, optical overlay tactics, in which genuine data is placed on the specialist's field of view for further development, have gained some traction among specialists. There has been a lot of interest in using speech as an interface since experts often have their hands full. Another outstanding interface for telemedicine applications is power and haptic criticism. The use of expert slave controller frameworks is a big feature of the telesurgery job at different times.

Action in the field of recovery mechanical technology started during the 1960s and has gradually developed during that time to a point where the first monetarily fruitful items are currently accessible. Today, the idea of "restoration robot" may incorporate a wide cluster of mechatronic gadgets going from fake appendages to robots for supporting recovery treatment or for giving individual help with emergency clinic and private locales. Numerous assistive mechanical frameworks have included a modern robot arm for reasons of economy and accessibility. Nonetheless, the determinations for robots in these two application regions are totally different. The distinctions emerge from the contribution of the client in recovery applications. Modern robots are ordinarily incredible and inflexible to give speed and exactness. They work independently and, for reasons of wellbeing, no human cooperation is allowed. Restoration robots should work all the more leisurely and be more consistent to work with safe client connection. Hence, recovery mechanical technology is more likened to support advanced mechanics, which coordinates people and robots in a similar errand. It requires wellbeing and extraordinary consideration should be paid to human-machine interfaces that must be adjusted for handicapped or non gifted individuals working a particular programming gadget. It is additionally perceived that there is a requirement for innovative work in mechanical technology to zero in on growing more adaptable frameworks for use in unstructured conditions. The main advancements of this sort in restoration advanced mechanics worry, among different points, mechanical plan (counting portability and end-effectors), programming, control and man machine interfaces. Subsection "Humanoid Robots" of this article develops new investigation into human-robot collaboration.

With a stage that can be moved by train components, the phrase "variable robot" refers to a mechanical framework capable of completing tasks in new locations. A robot's working environment has a significant impact on the train framework's design. Elevated, seagoing, or affixed to the ground are all possibilities. An further method for controlling robots in unusual circumstances is to put the administrator in charge.

Propellers and screws are the most common means of propulsion under elevated situations, although legs may also be used at the bottom of the ocean. There is a wide range of earthbound circumstances to consider while choosing a railway system. Wheels, rails, and legs are all that is required for a train to operate on the ground.

For example, mobility provides robots with a greater operating range and offers up new research avenues. Similar to the route problem, certain areas are common to all flexible robots while others have a distinct motion framework, such the walking stride. When the first contemporary robots were put into the production process, portable robots were also created. Some of the robots at this time were referred to as "directed vehicles" (AGVs) or "robotized vehicles" (AVs). An separate indoor and outdoor path for the assessment may be found in this place. The four stages of the independent versatile robot route are: climate observation, self-restriction, movement arranging, and movement age.

Using the restriction cycle, a portable robot can always know where it is in relation to its present surroundings. As a result, sensors are used to gather information about the robot's present status and its surroundings. These sensors are riddled with errors and produce wildly inaccurate predictions. Many studies focus on improving location estimation by integrating estimates from many sensors using Kalman channel techniques. When it comes to a restriction, it might be local or global. This is the most straightforward design, since the robot constantly corrects its position relative to an underlying region whereas under global restriction, the robot's position isn't necessary. What's more, the area interaction may be based on the sensorial identification of land-marks in the climate, or it may be based on guides or models of the climate and identify trademark components of the intended climate. Probabilistic approaches are used in this final scenario to address the problem of sensory data vulnerability.

There is a Bayes channel, which is a recursive condition that allows the robot's posture to be analysed from its perceptual and movement models, allowing for restriction calculations. Executing the Bayes channel is a waste of time and the possible rearrangements lead to a variety of limitations. Calculations that deal with the robot's convictions are divided into two distinct sections. However, if we employ multimodal dispersions, we find Markov confinement when looking at how the robot's conviction is represented by multivariate Gaussian densities. While a single-modular depiction of the robot's conviction may be used for localization, Kalman-channel based approaches have shown to be robust for tracking the robot's location. .

Map-based robot confinement and mechanical planning are linked, and since 1990, researchers have focused on addressing both difficulties simultaneously. There has been a split between metric and topological approaches to planning prior to this moment. While the climate's metric connections can be found in metric guides, the network of better locations may be shown in topological guides using hubs and circles. Metric guides are finer-grained than topological ones, but the greater aim comes at a cost in terms of computing time and effort. Depending on the chance of a room being occupied, metric guides may be discretized. It is referred to as inhabitance framework planning in the next stages of planning. Mathematical components' measurement guides, on the other hand, store the locations and attributes of objects that have clear mathematical requirements.

Since roughly 1990, mechanical planning has been referred to as synchronous limiting and planning (or just mechanical planning) (SLAM). While some methods need just a few attempts to cover all of the visible data, others require many iterations to cover the whole picture. In a wide range of gradual approaches, Kalman channels are used to measure and map the location of land-marks, signals, or other items in the environment. Expansions of the computations that are based on the Kalman filtering technique.

There has been a lot of effort put into developing leg-powered robots that can be taken anywhere. Figure 5 depicts a few of the latest developments. In the same way as current robots and flexible robots share some of the specialised challenges, the legs of walking robots are controlled by a few DOF controllers. Strolling robots have distinct advantages over other robots that can move in any direction.

In a haphazard terrain, legged robots can maintain their body balance without compromising their strength.

One of the key advantages of legged robots is its adaptability to a variety of obstacles, including stairs, hindrances, and ditches.

Robots with legs can easily traverse open, sand-covered terrain.

The inherent omni-directionality of legged robots is well-known.

Robots on legs have a less negative impact on the environment than those on wheels or tracks.

Legs, on the other hand, symbolise many difficulties at once. The focus of legged-robot research is unquestionably on all things related to robot route mobility and coordination.

Robot security is part of a broader issue of investigation. Mobile robots are generally considered stable if they can maintain their balance while in motion. When McGhee and Frank first described the static soundness of an ideal strolling robot in 1968, the study of strolling robot solidness began. Creepy crawlies awoke the potential of static strength, and the robot appendages' lack of latency was acknowledged. Some inertial impacts and other unusual parts (rubbing, versatility, and so forth) were discovered during the movement of robot limbs and bodies, restricting robot development to modest, constant speeds. Walking robots' pace was limited by the reception of static strength, so experts started to focus on dynamic soundness, in which robot parts became the most significant issue. A comprehensive review of the harm caused by walking robots and a subjective categorization may be found here.

III. CONCLUSION

We may find controllers, flexible robots and creature-like robots in the field and administrative mechanical technology worlds, where mechanical technology research began about 1995. Precision-driven robots have been the most important advances, and in the last several years, new areas in clinical and rehabilitation mechanical technology have arisen. Home cleaning, refuelling, and gallery exhibits are all examples of areas where different models may be found.

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Versatile Learning Plan and Improvement To Foster Understudy Dynamic Abilities in Friendly Enthusiastic Acquiring Process

[1]V. Lakshmi, [2]S. Selvakumari, [3]P. Ganeshbabu, [4]S. Ranichandra

Department of computer Science, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Email: lakshmiv5896@gmail.com (**V.Lakshmi**) *Corresponding author:* V.Lakshmi

Abstract:-Both innovation and education are intertwined and cannot be separated. Instructional innovation impacts the way students learn as well as teacher-student communication channels. Teachers, students, and schools are all put to the test in this situation to see whether they can come up with innovative and 1inimize11 teaching methods to ensure that the educational system operates smoothly. The goal of this study is to develop a training medium that promotes flexible learning. The ADDIE advancement model is used in conjunction with the R&D method for this assessment. Thirty understudies in Tangerang, Indonesia, have tested the validity and reliability of the information collection method using the Social-Emotional Learning Questionnaire. Pearson item No. 2 in quantitative methods is used for data exploration. Results of this study show that the SEL Questionnaire has 20 valid items, as well as a model for preparing dynamic ability as one of the social-emotional qualities necessary in the 4.0 contemporary unrests.. Pretest structure, content concerning dynamic expertise, contextual investigation, and assessment structure make up the model's four main components. This research reveals a new approach for enhancing students' dynamic abilities in leadership and guidance administrations, one that is based on innovation.

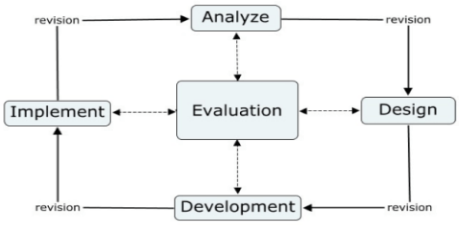
Key Words: Mobile learning ,Decision-making skills, Social-emotional learning Students

I. INTRODUCTION

Every now and again, human society comes up with something new. People use a variety of innovations to get things done in their lives and meet their day-to-day demands. The growth of invention is one of the current advancements. The Industrial Revolution 4.0 has been brought about by the rapid growth of invention (Rojko, 2017). Machines, PCs, and other mechanical devices are no longer the primary means of assisting human needs in the 4.0 contemporary turbulent period. Modern transformation 4.0 tries to help individuals collaborate and innovate, all things being equal. Currently, humans are not the primary source of entertainment in the contemporary world. Machinery, robots, and other types of programmed machines may all operate together in harmony with people now (B. Astuti et al., 2020). In addition, in the educational sphere, massive innovation in many aspects of scholastic life unquestionably becomes a challenge in the latter stages of development. Technology has been used by students on a regular basis in the 4.0 current transformation society. Web-based communication and data-gathering have been aided by cutting-edge innovations (Wiretna et al., 2020). The lack of interest and inspiration caused by a lack of innovation and creativity in learning may unquestionably impair students' success (Riswanto and Aryani, 2017; Tokan and Imakulata, 2019). The instructors also need to work with understudies' traits, requirements, and interests to ensure that the learning method works well and that understudies are motivated to study. Learning methods are essential to fostering students' motivation. Learning strategies that combine innovation with a learning system, or "mixed learning," are becoming more popular. Mixed learning is a discovery technique that combines a number of learning approaches to provide an effective learning experience for students. Students' decision-making abilities will be improved via the development of a mobile learning concept and design. Students' social-emotional learning abilities are expected to increase as a result of this progress in mobile learning. It's largely because the mobile learning design is appealing, contemporary, and enticing to students. Because the media employed are fascinating and relevant, students are more likely to engage in the learning process and 1inimize their decision-making skills as a result.

II. METHOD

Research and Development is responsible for conducting the study. The ADDIE paradigm established by Dick, Walter; Carey, Lou; and Carey, James is 1inimize in the development process (2015). There are five main steps to this process: research and conceptualization, creation, execution, and assessment. Mobile learning may be used to help pupils improve their decision-making abilities. This study is currently in the analytic and design stages. The researchers examine the decision-making abilities of 108 college students and develop a mobile learning strategy based on this information. Mobile learning apps will be created, deployed and assessed in the following phase. The steps taken in this study are indicated in the picture below.



ADDIE models for mobile learning development

For the purpose of gathering information on the material that will be included in the anticipated mobile learning, a thorough literature review is also undertaken. Examples of decision-making situations and characteristics of decision-making abilities are gathered in accordance with these procedures:

The ability to make good decisions

Decision-making is the process of deciding between two or more options that are presented to the individual. Making a decision requires a series of mental processes that help you choose a course of action based on a set of criteria (Wang & Ruhe, 2007). Consider all aspects of a choice before making a decision in order to obtain your intended outcomes. Making decisions involves four steps, as outlined by Huitt (1992).

Phase one is known as the input phase, and it is during this phase that a problem is first 2inimize22 and a perception is formed. Understanding an issue or scenario is critical at this step.

2) The decision-making process begins with this step. Finally, students have made a decision that is most suited to the issue or scenario at hand. In this step, students might begin to think about how to apply the choices they've made. Students might also devise plans for putting their choices into action.

After the choice has been made and implemented, the last step is the review phase. Whether the choice is accurate, students may determine if it needs to be updated or amended to reach the intended outcomes.

A person's decision-making process does not end until they have narrowed their selections down to just one or two. As a result, a plan for implementing the choice is needed, as well as an evaluation to see whether the decision follows the situation at hand or needs to be corrected. Mobile learning material will be developed based on this decision-making step in this study. Social-Emotional Questionnaire for Learning Techniques for 2inimize2 data Pearson In order to assess the survey's validity and reliability, the Product Moments analysis method is used. A reliability score of 0.882 is obtained once the validity and reliability tests have been completed, indicating that all of the items are valid.

III. RESULTS AND DISCUSSION

Mobile learning materials are aimed to help students enhance their decision-making abilities by including social and emotional learning. In the process of social and emotional learning, explicit teaching is used to help students develop social and emotional competence (Durlak et al., 2015). Student-centered learning, on the other hand, attempts to assist students and offer them direct access to diverse knowledge bases throughout the learning process and allow them to be actively engaged in it. Students' problem solving, general competency and social skills are also a focus of the programme (Asoodeh et al., 2012). Questionnaire validity testing on students' social, psychological learning is shown in the following table:.

As part of the social and emotional learning process, responsible decision making refers to one's capacity to take into account ethical, safety, and societal considerations while making the choice (Zhou & Ee, 2012). Making a choice in this area involves an understanding of the risks and consequences (Shah et al., 2016). Furthermore, measures must be taken to assess the repercussions of different activities and consider the well-being and mental health of individuals (Durlak et al., 2015). Pretest, content, and posttest are the three key components of this study's mobile learning application. Students are requested to take a pre-test on their decision-making skills in the first section. The pretest consists of 15 questions in the form of a survey. The pretest is given to determine a student's baseline score on their ability to make sound judgments. As a further step, students will engage in mobile learning activities that focus on developing their decision-making skills. Videos and images are used to convey the information, which is then accompanied with language that they can readily comprehend. Following Almarabeh et al. (2015), this is based on their claim that the innovation feature 2inimize in multimedia learning may boost interactions between students and instructors and make learning more appealing. Students benefit from the dynamic and enjoyable nature of the learning process as a result of the condition. Material to be used in mobile learning is outlined below:

Based on the phases of decision-making, these competences are evaluated. First, teachers come up with new concepts and designs for information technology-based learning media, second, teachers think about how to best use technology-based learning media based on students' needs and desired learning outcomes, and third, teachers think about how to evaluate the fairness of ideas due to factors like validity, practicality, and efficacy of the deliberative process.

The pre-decision stage, differentiation, and consolidation are the three phases and actions that make up responsible decision making. Prior to making a choice, students identify challenges and brainstorm possible solutions. Differentiation is the next phase, and it includes the actions students take to set criteria, weigh pros and disadvantages, evaluate existing information, obtain more information, test information in the circumstance, and come up with new options. The third step, which is called consolidation, comprises students' ability to increase their confidence in decision making and 3inimize the negative consequences of incorrect choice making (Meyer, 2018). A more recent study by Murtafiah et al. (2019) et al. divides concept generation, clarification, and validity assessment into three distinct phases is shown in figure 1.

Figure.1. Case Study1

The case study portion is introduced here. Examples of real-world events and difficulties are given to the pupils at this point. Based on the provided circumstances, the students are tasked with making judgments. Student analytical abilities will be honed in this case study portion.

Figure.2. Case study

Understudies are awarded a score after the posttest, as seen in the graph. The pre- and post-test scores are hinted to in this section. Using this, students may access and conduct their own self-assessment of their progress in relation to their dynamic skills and talents. The pre- and post-test scores may be easily accessed by clicking on the corresponding numbers in the score display. Understudies will undoubtedly find it easier to track their progress in developing their dynamic talents with the help of this component. Learning is shown I figure 2.

Understudy's sensitive talents may be developed via diverse acquisitions, according to the Cavus and Uzunboylu (2009) study. Flexible learning is also considered to be a viable medium for Guidance and Counseling services to prepare students for the dynamic skills needed in the new 4.0 world. A review headed by Edmonds and Smith (2017) found that portable learning, including correspondence, coordinated effort, and social abilities—all components of socially passionate learning—can enhance the educational experience (Jarvela, 2011). Students should be able to build and maintain strong relationships, make trustworthy decisions, and participate in a variety of social situations (Frey et al., 2019). Students' social and passionate learning may be bolstered by the use of mobile learning. This investigation is still in the early stages of planning and establishing the material substance. Because of this, the scope of the institution under consideration necessitates a focus on a variety of learning styles. Future research is expected to be able to stimulate portable learning in many areas of social-enthusiastic learning and to implement the media in a wider area.

III. CONCLUSION

Guidance and counselling instructors might employ mobile learning as a strategy to assist students strengthen their decision-making skills. Pretest, material, and posttest are the three main components of this study's attempt to develop mobile learning. The SEL questionnaire, which consists of 20 questions, is covered in the pre- and posttests. These products have passed the validity and reliability tests. Students' decision-making abilities are progressively improved via the input and processing,

output, and evaluation stages of the mobile learning design. All of the materials are geared on improving students' decision-making abilities via the use of films, texts, animations, illustrated pictures, case studies, and games. An advancement in mobile learning development is supported by prior research on mobile learning development to increase students' comprehension of school topics such as biology, mathematics and geography (Aripin, 2018), which is supported by this study (Rahmawati & Mukminan, 2018). Additional strategies for improving social-emotional learning skills, particularly in the decision-making aspects, are provided in this research that effectively supplemented prior studies that developed mobile learning to improve creative thinking and social skills in the social-emotional learning process (Edmonds & Smith, 2017). There will be no usage of media outside the limits of this study's target school. As a result of future study, mobile learning in social-emotional learning is projected to be developed in other areas and implemented broadly so that it may be generalised.

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TherapyBot – Mental health manager usingnatural language processing unit

Increases participation in activities: Although one may

Siddharth Katkar, Pratyush Pattnaik, Mohammed Fahad V K, Shaik Mohammed Farook, Madhumita Mishra
School of Computer Engineering, REVA University, Bengaluru, Karnataka, India

Abstract

One of the major health concerns in this Covid-19 pandemic is depression and stress. Millions of people throughout the world are suffering from a mental health disorder. Suicide is a quite common thing seen among depressed people. As a result, it is critical to provide self-aid to mentally stressed people early on. This research aims to create a mental assist chatbot that can evaluate the user's mode of operation as well as the sentiment ofthe user's contact and provide personal virtual psychoanalyst service. Additionally, it will guide in a personal and ethical manner to provide timely and effective self-help. It uses an efficient natural language processing unit to assess the textual input provided by the user and recommends a prompt and effective course way to heal the individual.

The purpose of this health care manager is not to replace the physical therapy with psychiatrist but compliment it and enhance the experience. we hope to reduce the stigma towards seeking help by integrating virtual therapy with proper therapy.

Key Words: Psychiatric counselling, Rasa Chatbot, Rasa NLU, Rasa Core, Natural Language Understanding/ Preprocessing, Mental health Application, Android Application, Postman, ngrok.

1. INTRODUCTION

Stress is a significant aspect that can influence a person's mental state. According to the NCBI, mental diseases are projected to account for 14.3 percent of all deaths worldwide, or nearly 8 million deaths per year [1]. As a result, it may be deduced that depression, stress, and anxiety are the primary causes of suicide in the general population. As a result of this research, an attempt has been made to assist those suffering from depression by providing them with a personal virtual psychologist A chatbot is a piece of software that facilitates communication via the use of audio or written prompts. While a chatbot can fulfil a user's fundamental informational needs by impersonating a friendly individual, a therapy chatbot can also fulfil the user's emotional needs by impersonating a therapist. Additionally, it is known as "online counselling" Because a person suffering from mental health issues is resistant to sharing intimate problems with another person for fear of being misled or criticised, the most acceptable channel for sharing is a virtual one

• Some people are hesitant to share their personal tragedies or troubles with others out of fear of being judged or mocked. Thus, in these instances, chatbots or dialogue systems can be employed to fulfil the user's usual informational needs by posing as a

friend or well-wisher.

• Communication facilitation: Chatbots are available to users, addressing issues of affordability and availability.

•Confidentiality is a vital consideration when any breach of personal information in these cases might have fatal effects, which is why a chatbot is advantageous, as no personal information is collected. Experience anger, engaging in leisure activities helps reduce stigma. The more activities a person participates in, the better they feel. It provides a type of mental relaxation and might act as a much-needed respite.

• The demand for more patient-centered apps capable of taking on the role of a health care professional, as opposed to generic ones, prompted us to pursue the idea. It is not only necessary but also urgent, as the topic is at is delicate it is important that the app is capable of handling such sensitive issues.

The following sections comprise the paper: Section II provides the project's literature review. The Methodology is explained in Section III. Section IV discusses Pre- processing Data. Section V represents the model being trained and assessed, while Section VI depicts the results. And Section VII brings the paper to a close.

2. LITERATURE SURVEY

A Chatbot to Aid in Psychiatric Counselling in a Psychiatric Facility Based on the 2017 IEEE 18th International Conference on Mobile Data Management paper, Emotional Dialogue Analysis and Sentence Generation [2], a conversational service for psychiatric counselling is proposed that utilises high-level natural language understanding (NLU). Additionally, emotion recognition is tested utilising a multi-modal technique. It is based on bidirectional RNN, which means that it only considers text from start to finish.

Digital Psychiatry - Using a Therapy Chatbot and Depression Analysis to Combat Depression: (ICICCT 2018) IEEE [3] - This article proposes a cognitive behavioural treatment system, or Therapy Chatbot, that collects a user's health and informational demands. It determines an individual's level of depression. Additionally, it provides methods for reducing an individual's depression level. It examines text to ascertain the user's state beginning with the first word of the phrase.

A self-aware Chabot built with deep learning, bidirectional RNNs, and an attention model (NCIBI 2021) [4] - In this paper, a chatbot is created using a Bidirectional Recurrent Neural Network (BRNN) with attention layers. The Bidirectional Recurrent Neural Networks (BRNN) are used to ensure that the chatbot responds appropriately to the user's input message, which can comprise between 20 and 40 words, and the model was trained using the Reddit dataset.

A Sequencing-to-Sequencing AI Chatbot with an Attention Mechanism: (arxiv.org 2020) [5]- This article shows how an intelligent chatbot is created using an encoder-decoder attention mechanism architecture that combines Recurrent Neural Networks with LSTM (Long-Short-Term Memory) cells. In this case, the Encoder is used to construct a fixed-length vector representation of the user's input message to the

chatbot, which is then used as the preliminary hidden state of the Decoder, which creates the desired response..RASA: An Analytical Study and Review (IJERT 2020) [6]

The Rasa chatbot is examined in this article; it is an open source, conventional AI assistant made up off components such as: Rasa NLU and Rasa Core. Additionally, this article discusses how a Rasa chatbot may connect with a database, APIs, and Tracker Store, as well as various Rasa files such as domain.yml and config.yml.

3. METHODOLOGY

Various elements of our app's architecture can be seen inFig. 1:

- The chat section is where the user can communicate withthe chatbot.
- Meditation section- Users can choose to meditate andrelax in this section.
- Learn section- Users can read online articles aboutmental health and well-being in this part.
- A to-do list allows the user to keep track of the things thatneed to be completed throughout the day.

The user can also access the meditation and article sectionsfrom the chat section.

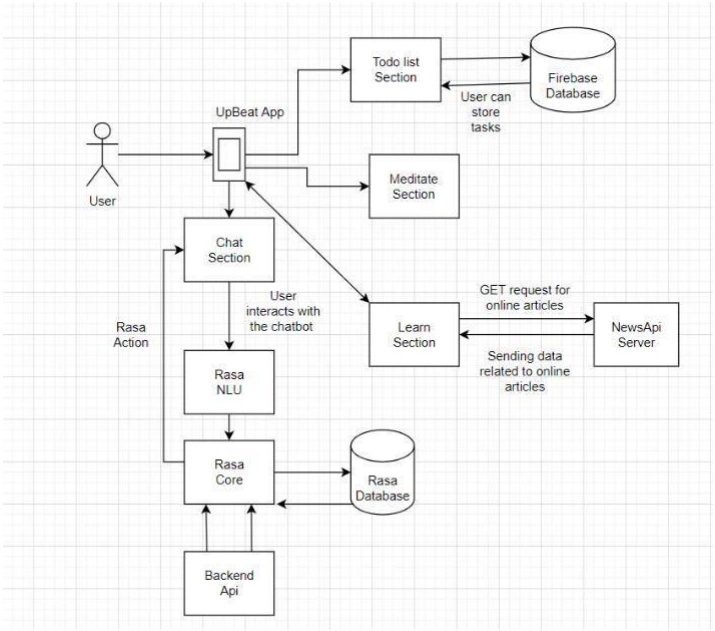

Fig 1. Application architecture

3.1 Chatbot Section:

This portion uses Rasa NLU for intent classification and entity extraction [7]. Rasa NLU parses incoming text and converts it to structured data, while Rasa Core keeps track of the discussion and decides how to proceed. Both Rasa Core and NLU use machine learning to learn from real- world conversations. This section will be central hub of sorts as the user will be able to not only speak their mind but also book, accesses therapy appointments as well as keep track of progression made.

Fig.2 illustrates the Rasa Open-Source design. Rasa consists of two basic elements. Natural Language Understanding (NLU) and Dialogue management. The natural language understanding component is responsible for tasks such as purpose classification, entity extraction, and response retrieval. In Fig.2, this is depicted as the NLU Pipeline, and then there is the dialogue management component, which, based on the environment, chooses the next step in a dialogue, as represented in Fig.2.

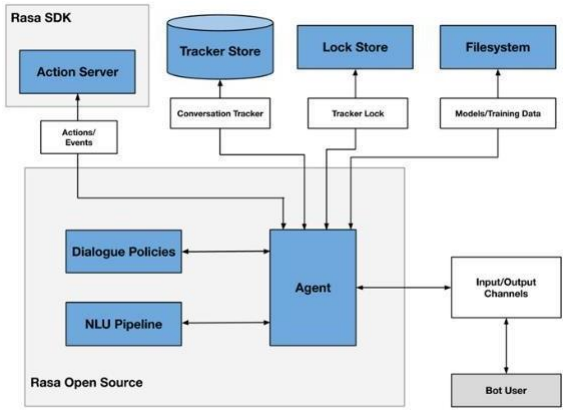

Fig 2. Rasa architecture

The Rasa NLU Pipeline is defined in the "config.yml" file. This file contains all of the pipeline steps that Rasa will use to classify the intents and take the relevant action. Each component that we used in this project is described in detail below.

• **Whitespace-Tokenizer**: Using whitespaces as separators, the tokenizer generates a token for each whitespace-separatedcharacter sequence.

• **RegexFeaturizer**: This component generates a collection of regular expressions defined in the training data format. RegexFeaturizer creates a feature for each regex that will be set to indicate whether or not the expression was found in the user message. Then, all of these features will be given into an intent classifier or entity extractor to facilitate classification (provided the classifier learned during the training phase that this set of features signals a particular intent / entity). At the moment, only the CRFEntityExtractor and DIETClassifier components enable these Regex-based entity extraction functionalities.

• **CountVectorsFeaturizer**: Constructs a bag-of-words model of user communications, intents, and replies, together with characteristics for intent

categorization and response selection.

• **HFTransformersNLP**: With the help of HuggingFace's Transformers library and a pre-trained language model, this module generates sequence and sentence level representations for each sample in the training data. via language model-specific tokenization and featurization.

• **DIET Classifier**: By default, Rasa contains a DIET Classifier (Dual Intent and Entity Transformer).. This classifier is capable of handling both intent classification and entity extraction. Its architecture is depicted in Figure 3.

- **Rasa NLU and Core**:

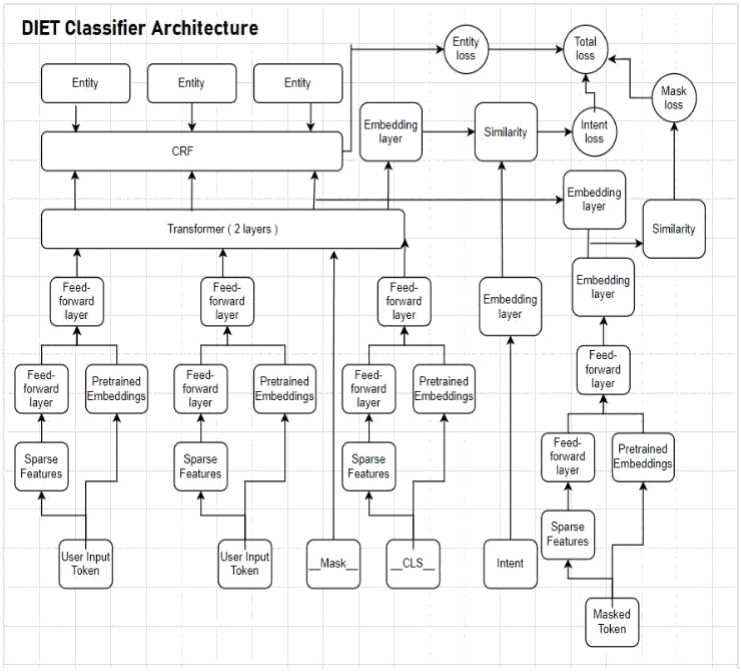

Fig 3. DIET Classifier architecture

_ _context" comes from user input tokens and the " cls "token, both of which have a significant effect on the intent. As a result, the gradient created by the Intent Loss is provided to the Transformer, which then passes it on to these tokens.

- The primary advantage of this design is that it can be customised to meet the specific requirements of your project.

3.2 Meditation Section:

This section is intended to assist the user in developing a daily habit of meditate ion while listening to soothing peaceful music provided by our App. By meditating, the user can

improve his or her concentration and calmness. This will assist the user in regaining control of his mind in difficult situations, allowing him to avoid panic and make sound and rational decisions.

Rasa DIET Classifier Architecture, although rasa gives the programmer complete freedom to choose any classifier, the default one provided by rasa is termed DIET Classifier.

- Now that the user's response to the chatbot has been tokenized, it is delivered to the DIET classifier. These tokens are converted to sparse vectors using One-Hot Encoding and then to a dense numeric vector using pre- trained word embeddings such as BERT, GloVe, and ConVert.

- We used BERT word embeddings for this project. The sparse vectors are fed into a Feed Forward Layer, and the output is mixed with the dense word vectors from the pre-trained word embeddings and fed back into the Feed Forward Layer. Rasa starts with sparse Feed Forward Layers and eliminates 80% of the connections. In fact, these Feed-Forward layers are identical in weight and are kept sparse.

- Thus, we have a vector from this procedure, which is essentially a feature extracted from the input token, which is then sent to the Transformer. The DIET classifier applies this process to all input tokens. Rasa summarises the input tokens in this fashion.

- Now, Rasa utilises the " cls " token to summarise the full input sentence. As you can see, we have a Sparse Features block. This block calculates the sum of the Sparse Features of the input tokens. Then there's the block for Pre- trained Embedding, which will take care of sentence embedding while we're using BERT.

- This produces a vector representing the summarization of the user input sentence, which is subsequently provided to an Embedding layer for the purpose of predicting the user input sentence's intent. The output of this is compared to actual intent to determine the degree of resemblance, which yields Intent Loss.

- At the heart of Rasa Architecture is a Transformer block that utilises the Attention mechanism. Rasa comes with two levels of Transformer by default.

- Because we did not use entity extraction and masking in this project, the overall loss will consist solely of intent loss. Thus, the Transformer is the central block that assists in identifying these losses, which are then improved toincrease the chatbot's accuracy.

- Within the Transformer, all of the Token Blocks' output vectors have impact, and when we use the Transformer's output vectors, these vectors have some additional context. Now take the scenario of Intent Loss; the "additional

3.3 Learn Section:

This section was created to educate users about their mental health and well-being; here, users can read online articles on a variety of topics related to mental health, leadership, self- improvement, and positivity. This will contribute to the user developing a positive attitude. The online articles in this section were retrieved via an HTTP GET request to NewsApi Api and cover topics such as mental health, positive attitude, and leadership.

3.4 User Profile Section:

This is the section where the user can view his or her progress, such as how many tasks were completed in the previous week and how the user's emotional state was on those days. This enables the user to self-assess his or her level of activity.

3.5 To-Do List Section:

This section is intended to help the user keep track of all the tasks he or she wishes to complete throughout the day. Our primary objective is to assist users in developing an effective schedule that will enable them to complete their work on time. The Firebase Realtime Database is used to store all tasks entered in this section. Firebase Realtime Database is a type of BaaS, or Backend as a Service. For this project, we used Firebase Realtime Database and FireAuth for user authentication.

3.5.1 User Authentication and Database:

We used FirebaseAuth and Firebase Realtime Database for user authentication and database storage, respectively. OAuth2 is supported by Firebase Auth for Google, Facebook, Github, and Twitter. Additionally, it includes the fundamental email-Password user authentication method; in this project, we used Email-Password Authentication. Firebase Realtime Database is a NoSQL database that is extremely fast and dependable.

3.6 Connection of user with chatbot server:

The chatbot will not be present locally within the mobile application but will be hosted on a server. Thus, all communication will occur via HTTP GET/POST requests from the mobile app to the chatbot server. Thus, we used Ngrok [9] for this purpose, which exposes the local server hidden behind NATS and firewalls to the public internet via secure tunnels.

•ngrok is a cross-platform tool that connects a local development server to the Internet. No requirement for a public IP address or domain name on the local PC..

• It can avoid NAT Mapping and firewall constraints by constructing a permanent TCP tunnel from ngrok.com to a local workstation..

4. DATA PROCESSING

We created data with various intents such as greet, goodbye, affirm, deny, happy, unhappy, and so on. In a chatbot's settings, "intent" defines what the user wants to communicate with the chatbot. Separate files "stories.yml" and "actions.py" are used to reference different stories and actions. The "stories" section defines how the chatbot should manage conversations, while the "actions" section contains all the actions that the chatbot can perform. Finally, there is the "policy" section, which is referenced in the "config.yml" file. This section assists in making accurate predictions of the actions that the

chatbot must perform; inthis project, we used the "TED policy." All of this helps trainthe chatbot [10] to produce the desired output. The training and testing data sets are split in an 80-20 ratio. The rules that the chatbot must follow are specified. These rules are defined to ensure that the chatbot correctly responds to specific types of queries.

VI. Result

TRAINING AND TESTING MODEL

Initially, we did not use any pre-trained word embeddings such as Bert, GloVe, or ConVert. As a result, theresults of the testing are shown in **Fig.4**

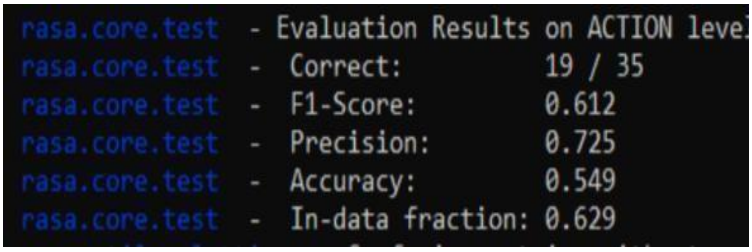

Fig 4. Testing the model without using any pre-trainedword embeddings

In Fig.4, you can see the Evaluation Results at the ACTION level, which indicates how many of your chatbot's actions were correctly executed in comparison to the total expected actions. At the moment, our model's accuracy is 54%.

To improve the model's accuracy, we combined it with pre- trained BERT word embeddings. This aided in improving the model's accuracy, as illustrated in Fig.5. The accuracy ofthe model was increased by using it, and this time we also used Rasa's end-to-end learning, which means that rasa can now predict the next action that needs to be performed based on the user's input message. Rasa's end-to-end learning is a new feature introduced in version 2.2.

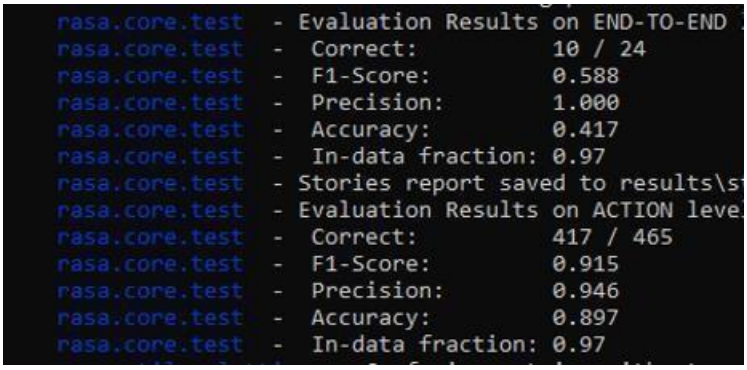

Fig 5. Testing the model using pre-trained wordembeddings BERT

This is a chatbot that will run on different operating systems and will be connected to the user via an Android application.

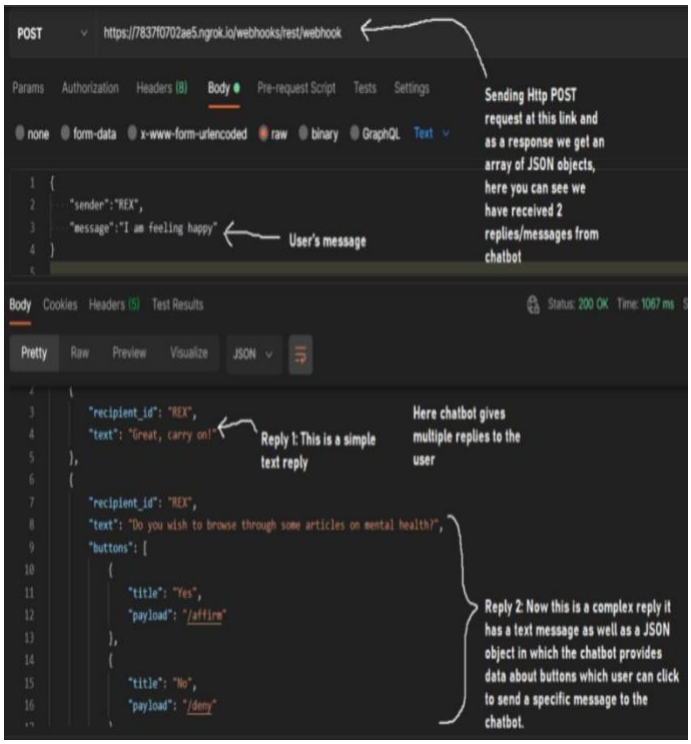

Fig 6. Postman showing request and response from the chatbot.

As a result, we assessed this using the Postman tool, which is commonly used for API testing. As shown in Fig.6, the Http post request is sent to the URL first, followed by the user's message. The chatbot communicates with the user by sending a reply that is essentially a JSON Array. This array contains a JSON object containing the response itself. As shown in Fig.6, the chatbot provides a text response and then a nested JSON object for the key "buttons," which contains the "affirm" and "deny" buttons. This message will be displayed as actual buttons on the frontend.

VII. Conclusion

Thus, we have created a contextual chatbot that converses with or responds to the user based on their mood. We designed this chatbot in such a way that it responds to the user's anxiety or loneliness, as well as his happiness. By doing so, we do not intend to convey the message that a chatbot can take the place of a trained professional in psychiatric counselling. This chatbot will assist users in developing a more positive outlook on life and in breaking the recursive cycle of negative thoughts.

VIII. Future

Our project successfully converses with a user, attempting to ascertain his mood and assisting him in lifting it. The future of this project is contingent upon advancements in the field of natural language processing, which will aid in maintaining a proper flow of conversation and automate all dialogues. By increasing the epochs, we can improve the chatbot's accuracy. Epochs are the number of times your machine learning model will encounter each training example during the training process. Additionally, you could consider adding spaCy embeddings to the pipeline, which would add additional features that would benefit the DIET classifier. One can use a spaCy-trained pipeline such as en_core_news_md or en_core_news_lg for

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Molecular Representation of Organic Compounds in Augmented Reality

Sanjana S, Shradha B Kaba, Dr. Gururaj Murtugudde

School of Computer Science and Engineering,
REVA University, Bengaluru.

Abstract.

Due to the molecules forming the compound molecule, the structure becomes large and complex, making it increasingly difficult for instructors to teach and students to comprehend visually. There are currently only a handful of resource to help students learn and understand chemistry concepts better. AR is a new technology and its popularity is growing rapidly, and chemists are slowly starting to investigate the benefits of using AR in education. Augmented reality augments elements of the world. Information about three-dimensional structures can be difficult to represent in two-dimensional space, despite the fact that augmented reality allows users to view 2D structures in 3D.

Keywords— Augmented reality, organic chemistry, molecular geometry, human computer interaction

1. INTRODUCTION

Organic chemistry is conceptually challenging since visualization of the structures of molecules is strenuous in a 2D space. Furthermore, as we discover more molecular reactions, and the molecules themselves grow complicated, understanding intricate details spans into three dimensional representations.

Chemists are asked to draw molecules in simplified ways to convey the geometry of complex compounds. An emerging technique is the inclusion of augmented reality technology into the teaching and learning process.

AR is a technique that superimposes computer-assisted contextual data onto the actual world, removing the need to rely on 2D representations of 3D structures. An instructor is no longer compelled to make arbitrary judgements about the best representation for achieving the learning goal. This project goes beyond conventional 2D constraints, thus offering users the direct control of understanding these structures, through interactive interfaces thus inculcating cognoscible learning abilities. The analysis of molecular structures of chemical compounds is a critical goal in teaching chemistry theory since the interpretations of physical and chemical parameters of the compounds are obtained. Using 3D models of molecules to explain theories improves clarity, leads to improved comprehension of organic compounds, geometrical, and interference mechanisms, as well as the forecasting of chemical reactions.

Systematic Literature Reviews have been conducted in recent years to comprehend the use of AR in the field of education, and have provided context regarding the advantages,

drawbacks, and limitations. A few SLR elaborates on how AR can affect learning methodologies, while others had particular objectives, with research on how AR has evolved and upcoming trends in learning systems. Only a few studies outlined the specificities of Augmented Reality being used to represent organic compounds at molecular levels. This corresponded to a requirement to understand how AR can be potentially used to develop new advancements and directly impact traditional methods of teaching.

The ability to comprehend organic compounds comes from a detailed understanding of the atomicity and structural representation of these molecules. Since the structures are to be observed and studied at molecular levels, being reliant on technology that can aid in visualizing such elements is vital. With AR gaining momentum in terms of development and use since the year 2000, it became relevant to understand the types of AR devices available, how chemistry education can be leverages as well as the limitations associated with this research. These set the foundational guide on upcoming advancements in education-focused AR projects, forming new aspects for future improvements and how these studies can transform current methods of learning..

A. Objectives

Application goals: To motivate students` interest in chemistry. To be able to study while having pleasure and to believe that the knowledge they obtain is relevant and valuable. To ensure that the AR interface is compatible with the vast majority of mobile devices.

3D structures that can effectively help people understand molecule for increased interactivity and user-friendliness. Therefore, we are confident that this system will provide a unique type of object visualization that interacts with more realistic virtual models.

1. Our aim is to increase learners' interest in Chemistry.

2. To be able to learn while having fun and deem the knowledge they receive to be relevant and beneficial.

3. Develop AR interfaces compatible with mobile devices.

4. To add more features to the application allowing users to customize the model according to their needs, such as changing colour, brightness, etc.

B. 3D spatial thinking

Spatial thinking is the capability to remember and manipulate abstract visual images. In chemistry, spatial reasonings are mostly taught using 2D paper models or by using 3D computational models.

These models are meant to assist students understand chemistry by merging information from the macroscopic, microscopic, and symbolic domains. Augmented reality apps may use the camera on a smartphone to transform 2D paper-based chemical models into 3-D representations that the user may manipulate.

C. Pain-points

Due to the molecule's chemical structure and the combination of different molecules forming the compound molecule, the structure becomes large. As a result, it becomes more and more complex, and visualizing compounds becomes exponentially difficult.

When chemistry majors are often asked to draw molecules in a simplified way on a 2D interface. This may not be effective in understanding the actual structure of these molecules, otherwise understanding the chemical reactions of these molecules is very difficult.

Given the problems described above, it becomes clear why the development of a smartphone application to visualize molecules in three-dimensional interface will be beneficial. This reduces discrepancies in understanding organic chemistry and encourages others to understand comprehensive topics easily through their own pace.

2. PROBLEM DEFINITION

"How might we develop an AR Application which encourages, aids and motivates students to visualize molecules to enhance their understanding of molecular chemistry "

The challenge of visualizing molecules in 3D arises in the chemical sciences at many levels, from teaching the concepts of stereochemistry to visualizing the complex molecular structures. As molecules get bigger, more complex, and expand into three-dimensional space, visualization becomes more and more difficult. Chemists or teachers often need to draw molecules in a simplified way to represent the geometry and symmetry of complex compounds. A simple way to visualize molecules in 3D would be very helpful.

3. MOTIVATION

The motivation towards developing this project is focused towards aiming to advance conventional learning methods being used to teach students, towards a futuristic approach that can leverage AR to better educate within the scope of molecular chemistry. The scientific motivation can be attributed to encouraging users to involve themselves with the activities, conduct experiments and review their findings.

Primary, the scientific motivation towards this study can be attributed to four influential factors: encouragement to learn science and explore its sub-branches; intrinsic motivation- to create a self-assessed understandings and findings from experimental data; and self-efficacy. The ability to leverage AR through these findings, to create an advanced learning environment that is accessible, easy to understand chemical concepts at a molecular level, and can be improved is the primary motivation that led to the development and research of this project.

4. AUGMENTED REALITY

Consider Virtual Reality to be an umbrella term, this term constitutes other findings such as augmented or mixed reality. Unlike conventional Virtual Reality, Augmented Reality has a user interface that integrates the physical and virtual worlds, enabling consumers to combine real-life surroundings with virtual objects for a native and pragmatic experience. AR enables the interactive and real-time merging allowing users to see the information they perceive, in reality.

It's worth noting that Milgram and Kishino's definition focuses solely on graphic representation. However, in this instance, AR might be regarded as a bridge between virtual and real-world perspectives, with AR acting as a supplement to VR. As a result, Augmented Reality cannot totally reinstate the physical universe; rather, it gives us the

impression that simulated and physical items co-occur in the same space. Azuma study, otherwise, recommends three important features for computational systems that embrace AR:

(i) blend simulated elements with the actual world; (ii) are interactable and enable real time processing the key concept driving the usage of AR in such research is the creation of immersive digital materials and technologies that provide consumers with unique & effects.

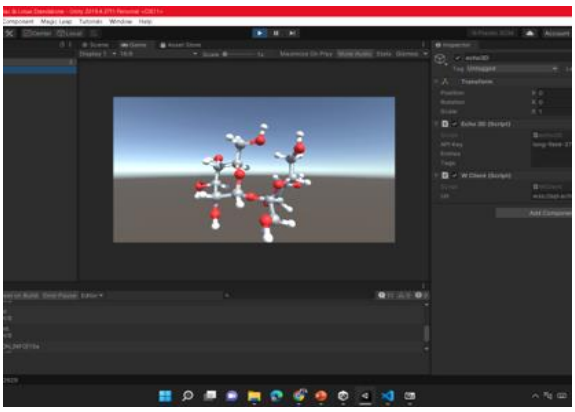

Fig 1: Unity app for building AR scenes

5. LITERATURE SURVEY

D. Eriksen, Nielsen, and Pittelkow's (2020)

It can be challenging to present information on 3D structures in 2D, whether in compound or molecular form, for example, through textbooks or a digital device. Furthermore, augmented reality may be utilized to depict 2D structures in 3D and make the models user-interactive so that they are easier to recall and absorb visually for the peers.

E. Derek Behmke, David Kerven, Robert Lutz, Julia Paredes (2018)

Chemistry in Augmented Reality: Creating Interactive 3D Structures from 2D figures made possible, according to research on visual spatial capabilities in chemistry, it was discovered that students struggle with comprehension with molecules owing to their complicated architecture and incomplete design, making it tougher to make sense of it. As a result, blending AR into learning can dramatically boost learners' capacity to interpret.

F. McCormack (2014)

Augmented reality- invent. Through the research it was observed students had to deal with great difficulty with chemistry, particularly organic chemistry. To address this issue and to test the effectiveness of AR technology, Fresh college chemistry students were prepared for online teaching in a virtual lab. After a month of study as a result, most learners say this is a great tool and will recommend it to others. While many VR applications have proved useful, interactive VR techniques are thought to be challenging and limiting.

G. Barak, M. (2013)

Making Visible: Integrating 3D Molecular Imaging into K-12 and Post-Secondary Education Even at the college level, many students struggle with three-dimensional visualization. These issues stem from a misunderstanding of fundamental chemical principles. AR technology, on the other hand, may be utilized in institutions to help students establish a better foundation and make studying an enjoyable and productive process through interactive engagements.

6. DISCUSSION AND RESULTS

On conducting further studies into Valence Shell Electron Pair Repulsion – a defined principle that explains how chemical structures are. The geometrical structure of the molecules can be explained using this theorem, which can calibrate the intensity of electro-static repulsion for better understanding. Furthermore, we can leverage these findings to make an educated guess about the shape and structures of said structures. Through trials and tribulations, it has been established that one tends to interpret special objects and gain a better understanding when they can view them in three-dimensional spaces. Thus, it is encouraged to push this forward thinking methodology through practice. For instance, three-dimensional printing and simulation experiments are popular models.

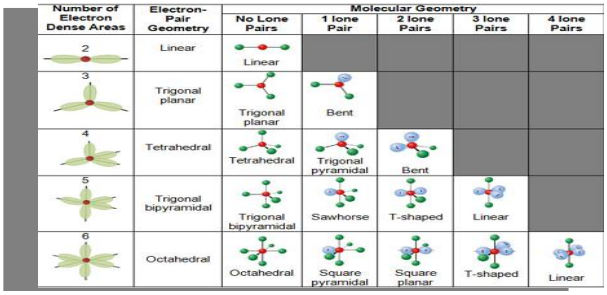

Fig 2: VSPR in theory

When a smartphone is pointed towards a flat surface, a 3D model appears, which may be modified in many ways (inversion, magnification, seeing from various angles) to better comprehend its structure and operation. The applications that have been posted make it possible to create the study content and make it simpler to remember. The instructor, on the other hand, has the capacity to shorten the time it takes to explain a theory and to use that time to address contentious issues, solve creative problems, and so on.

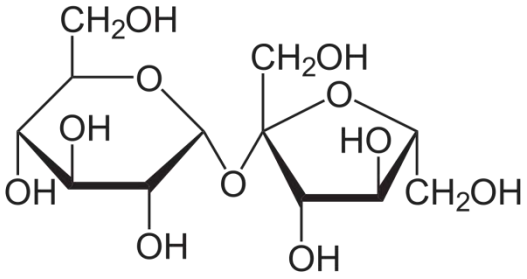

Fig 3: Chemical structure of a Sucrose molecule

When the chemical structure of Sucrose is illustrated in a two-dimensional interface, it is evident that the structure is difficult to comprehend. The molecules are arranged in a 3D format and viewing them on a plane surface can be cumbersome to understand and interpret. Using our AR application, users can now view these molecules in an augmented reality environment, and can interact with these structures, by moving them and observing the chemical composition in a comprehensive way that also makes it easier to remember.

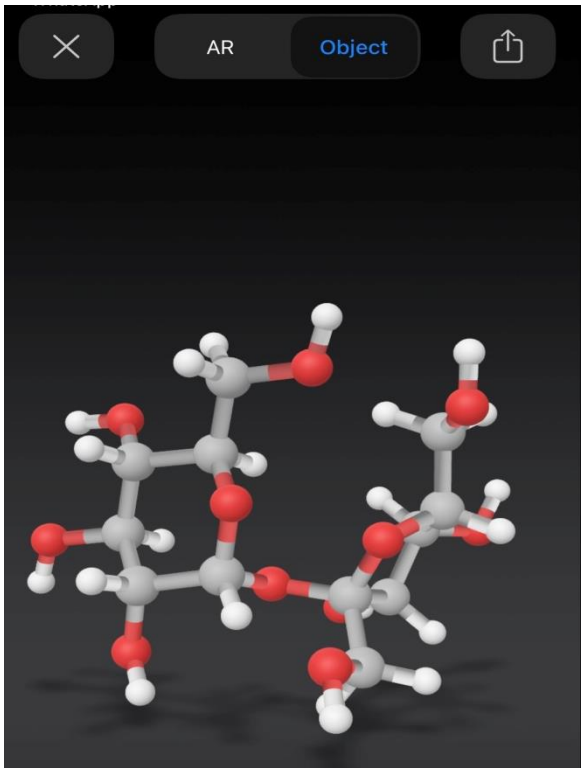

Fig 4: Sucrose molecule in an augmented reality environment

This is a research and development project that follows a scrum-agile methodology, research, design, development, implementation, and review are the five steps of the workflow.

When it came to research, we decided to distribute a questionnaire that contained questions pertaining about Augmented Reality and topics pertaining to chemistry. Furthermore, we reached out to students who were willing to share their opinions about understanding molecular concepts and their experience with using augmented reality. This exercise gave us much insight into understanding the general expectations one may have when it came to sing educational apps, and the use of apps that are accessibility friendly and is engaging as well.

In summary, these insights provided details into what students expect when it comes to being able to integrate AR apps with a better understanding of chemistry. With over 91.4% being interested in using AR apps for better understanding of stereochemistry; over

78.23% having prior knowledge of using AR apps and 67.40% answering affirmitavely when questioned if learning chemistry would be better comprehendible in an interactive environment. These are a few instances of the data that was collected.

With this information, we proceeded to the design phase of our application. Here, we wanted to initially establish requirements that were fundamental and then proceeded to conduct sprint reviews of the workflows, user interface components and colour scheme that was in relation to the overall theme. The tools we used here, were Figma, Notion and Dribbble.

When it came to development, we had a deep dive into the various available tools in the market and which one closely resembled our interests. This includes understanding the popular software, verifying their usability, open source friendly as well as the overall development time required.

This introduced us to tools such as Unity, Vuforia, AR Kit etc. Here, we also had to make trade-offs between usability, costa as well as development platforms. With us focusing on developing on Android devices first. This phase was about understanding the components that were required, such as AR physical tools, 8chemical structures that can be viewed in a three-dimensional plane of view and an APK that will be able to install on devices for further testing. Overall, the major software used were:

- Unity 3D
- Vuforia
- Android Smartphones
- JMol

Ultimately, we wanted to be able to test our application. Besides the failure mechanisms that we had in place through the device's code, we also conducted a test on various Android versions to verify background compatibility. We also were able to test it among a group of students and teachers, primarily from chemistry backgrounds and collected feedback for improvable features in future iterations. Finally, we verified the usability of the application by collecting end user data.

7. COST ESTIMATION

When discussing Virtual Reality, the clientele is large, and it continues to grow. Companies like Facebook, Google and Amazon have released software that inculcate the use of virtual reality and the trend is also spreading towards augmented reality and mixed reality domains.

In VR markets alone, the users have crossed over a billion, and the revenue overall has been trifold in recent years. The user curve is only expected to go higher, with predicted values in billions by the end of the decade.

Additionally, the technologies have not only reinvented the concept of gaming, learning, and have started to increase in other industries, they have also become more accessible. This encourages growth and aids many groups to enjoy augmented reality developments, while also using them independently.

With this technology booming as of late, the overall costs of developing an app for augmented reality ideas becomes an important decision. Like any other software, the costs are dependent on several factors ranging from active clientele to geographic locations. The convergence of the physical world with augmented virtual experiences is an emerging study. With these in mind, some factors that influence the development of an AR app are as follows:

1. Software – The software used for an application is a huge element that influences costs. This is due to the multitude of software available on the market, choices between open-source or licensed software and also, development platforms

2. Development Time – This can range widely but it is acceptable to estimate an average time of 150-180 hours.

3. Features – Augmented reality can be simple or have advanced features. Understanding your app requirements is vital to estimating the features required in an AR app, and furthermore, concluding quality and costs associated with it.

In a recent article, there were a few other factors highlighted that can determine the costs involved in the development of an AR app. These were, based on location, slam or marker apps. However, the biggest cost estimator is based on the device software as well as external devices such a VR headset and handheld devices.

8. COMPLIANCE WITH SOCIETY

The tremendous advancements in AR in the realm of education, and particularly, have spurred a rapid development of its utilization in learning and teaching operations. AR has prompted a great deal of interest in the discipline of chemistry, primarily because it allows students to comprehend processes that aren`t apparent to the unaided eye.

We have also complied with accessibility principles, in order to improve our application and make it convenient, thus enabling these decisions in order for everyone to take part independently. The importance of accessibility was a study conducted by Texas State University, it emphasizes access by everyone, regardless of disability is an essential aspect.

To overcome: teaching approaches are still focused on fact retention. Information is frequently tough to grasp, there is a lack of involvement.

9. CONCLUSION

The extraordinary growth of AR in the field of education, particularly in the field of learning and teaching activities, has driven the rapid development of AR usage in learning and teaching activities. AR has sparked attention in the realm of education, primarily because technology helps pupils to comprehend processes that are invisible to the human eye.

AR has been incorporated with many educational experiences ranging from Google Expeditions (a hybrid of AR and VR that spotlights notable sights and artefacts) to Geo-Goggle, which teaches how to measure altitude and distance between two points using a 3D compass.

The current method of learning presents substantial challenges: The pedagogical method is still centred on knowledge retention. It has been observed that information is frequently descriptive. In and out of class, there is a lack of participation.

Making the student experience more pleasurable is one of our answers. Virtualized in order to improve interactive comprehension and learning. Improves student engagement, comprehension of complicated topics, and personalised instruction, increases learning retention, and reduces reliance on learning by rote.

However, using AR and VR in eLearning can be costly since these technologies require pricey software and gear. AR and VR both require a lot of room and restricts mobility.

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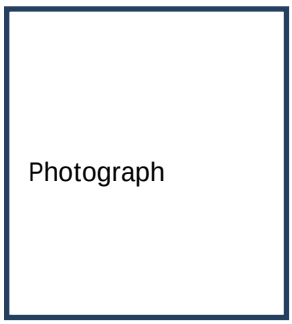
Biographies



Author Name received the bachelor's degree in computer engineering from Cankaya University in 2010, the master's degree in computer engineering from Gazi University in 2014, and the philosophy of doctorate degree in Electrical-Electronics & Computer Engineering from Duzce University in 2017, respectively. He is currently working as an Assistant Professor at the Department of Computer Engineering, Faculty of Engineering, Duzce University. His research areas include mobile security, deep learning, and social network analysis. He has been serving as a reviewer for many highly-respected journals.

Cancer Subtype Prediction

Dileep Kumar Reddy J K
Computer Science & Engineering
REVA University
Bengaluru, India
r18cs[illegible]@cit.reva.edu.in

Veerendra Patil P
Computer Science & Engineering
REVA University
Bengaluru, India
r18cs535@cit.reva.edu.in

Soham Kishor Misal
Computer Science & Engineering
REVA University
Bengaluru, India
r17cs404@cit.reva.edu.in

Dr. Nimrita Koul
Associate Professor
Computer Science & Engineering
REVA University
Bengaluru, India
nimrita.koul@reva.edu.in

Abstract – Cancer is caused as a result of unconstrained cell growth. It has several subtypes, identification of these subtypes in a quick and efficient manner is crucial in the treatment of cancer patients. TCGA RNA-Seq dataset is chosen for training the Deep Learning Model. Several pre-processing methods such as handling missing data, feature selection and normalization are applied. The feature selection technique used is Recursive Feature Elimination, it helps select 50 genes out of 20,531. The gene data corresponding to each patient is stored in a NumPy array.

The array is then used to create heat maps with the help of imshow() matplotlib function. The dataset contains 33 labels. A CNN model is built to predict the subtype of cancer. The model has an accuracy of 73.87%.

Keywords – Cancer, Convolutional Neural Network (CNN), Deep Learning (DL), Recursive Feature Elimination (RFE), TCGA, RNA-Seq

I. INTRODUCTION

Cancer is ranked as the second biggest cause of death worldwide, accounting for one out of every six fatalities. To reduce the impact of cancer on people's health, significant research initiatives have been directed towards its screening and therapy strategies. The goal of cancer diagnosis is to classify tumors and identify indicators [1, 2, 3] for each malignancy so that we may construct a learning system that can detect cancer early on. The need for implementing Artificial Intelligence to identify new genetic markers is becoming a crucial element in many biomedical applications, with heightened understanding of targeted therapy and timely identification strategies progressing over decades of technological advancements, accomplishing a responsiveness of around 80%. The Cancer Genome Atlas (TCGA) [11], which contains more than 11,000 tumors representing 33 of the most common types of cancer, is a well-known resource for cancer transcriptome profiling.

II. RELATED WORK

For classifying pan-cancer, the authors of paper [1] have utilised the GA/KNN approach.

The characteristic selection engine is the genetic algorithm (GA), and the algorithm used for classification is the k-nearest neighbours (KNN) method. They were able to uncover multiple groups of 20 genes which could properly categorise well over 90% of the data from 31 types of tumours in a validation dataset just by making use of the RNA-Seq expression of genes.

To help diagnose and evaluate cancer the authors of paper [2] made use of unsupervised feature learning [5, 6] with the help of data from gene expression [7, 8]. The key advantage of the suggested approach above earlier cancer detection systems is the ability to automatically create features from data from multiple forms of cancer to aid in its diagnosis of a particular type. To determine and identify cancer, the system provides a more thorough and generic

strategy.

The authors of paper [3] have made use of the TCGA RNA-Seq data [11] to categorize 30+ various types of cancer patients. They compared the efficiency, learning period, accuracy, recalls, and F1-scores of 5 machine learning methods, namely decision tree (DT), k nearest neighbour (KNN), linear support vector machine (linear SVM), polynomial support vector machine (poly SVM), and artificial neural network (ANN). The results demonstrate that linear SVM [9, 10] is the top classifier in the investigation, with an overall accuracy of 95.8%.

The researchers of paper [4] used TCGA RNA-Seq data [11] from about 30 various types of cancer patients, as well as healthy tissue RNA-Seq data from GTEx. One thousand and twenty four genes with the greatest up or

down regulation counts across the entire dataset are chosen. The input for model training is the expression data of the selected genes.

The training data is converted to RGB colours by transforming gene expression levels into binary format of 24 bits. A Convolutional Neural Network (CNN) model is used to carry out the training of the model. The proposed algorithm has an accuracy of 97%.

III. DATASET

The TCGA RNA-Seq dataset is chosen to train the CNN model, it contains 33 different types of cancer, they are ACC, BLCA, BRCA, CESC, CHOL, COAD, DLBC, ESCA, GBM, HNSC, KICH, KIRC, KIRP, LAML, LGG, LIHC, LUAD, LUSC, MESO, OV, PAAD, PCPG, PRAD, READ, SARC, SKCM, STAD, TGCT, THCA, THYM, UCEC, UCS and UVM.

IV. METHODS

(i). Pre-processing:

a. Missing Data:

The null values present in the dataset are dropped by making use of the pandas dropna() method.

b. Feature Selection:

Recursive Feature Elimination technique is applied to select 50 genes out of the available 20,531 genes.

c. Normalization:

The 50 selected genes are normalized in the range 0 to 255.

(ii). Heat Maps:

In order to create heat maps, the data present in the csv file is first transposed. Now the patient ids are represented in rows and the various types of genes are represented in columns. The gene values of each patient are fed to a NumPy array. The matplotlib function imshow() is used to create images from the 2-dimensional NumPy arrays.

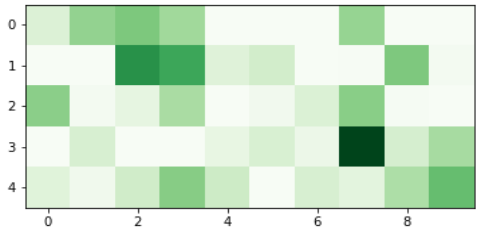


Figure. 1 Heat Map of cancer type ACC

(iii). Model Architecture:

The CNN architecture represented by Figure.2.1 and
Figure. 2.2 is used for training, it consists of 7 convolutional layers each consisting of a kernel size of 3x3, 7 pooling layers, 7 batch normalization layers, 2 dense layers and 1 dropout layer. ReLu is the activation function used for the aforementioned layers. Softmax is the activation function used for the last dense layer. In order to avoid overfitting, the dropout rate of 0.15 is used.

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 224, 224, 16)	448
max_pooling2d (MaxPooling2D)	(None, 112, 112, 16)	0
batch_normalization (BatchNo	(None, 112, 112, 16)	64
conv2d_1 (Conv2D)	(None, 112, 112, 32)	4640
max_pooling2d_1 (MaxPooling2	(None, 56, 56, 32)	0
batch_normalization_1 (Batch	(None, 56, 56, 32)	128
conv2d_2 (Conv2D)	(None, 56, 56, 64)	18496
max_pooling2d_2 (MaxPooling2	(None, 28, 28, 64)	0
batch_normalization_2 (Batch	(None, 28, 28, 64)	256
conv2d_3 (Conv2D)	(None, 28, 28, 64)	36928
max_pooling2d_3 (MaxPooling2	(None, 14, 14, 64)	0
batch_normalization_3 (Batch	(None, 14, 14, 64)	256
conv2d_4 (Conv2D)	(None, 14, 14, 128)	73856
max_pooling2d_4 (MaxPooling2	(None, 7, 7, 128)	0
batch_normalization_4 (Batch	(None, 7, 7, 128)	512
conv2d_5 (Conv2D)	(None, 7, 7, 128)	147584

Figure. 2.1 Architecture of CNN Model

max_pooling2d_5 (MaxPooling2	(None, 3, 3, 128)	0
batch_normalization_5 (Batch	(None, 3, 3, 128)	512
conv2d_6 (Conv2D)	(None, 3, 3, 256)	295168
max_pooling2d_6 (MaxPooling2	(None, 1, 1, 256)	0
batch_normalization_6 (Batch	(None, 1, 1, 256)	1024
conv2d_7 (Conv2D)	(None, 1, 1, 256)	590080
max_pooling2d_7 (MaxPooling2	(None, 1, 1, 256)	0
batch_normalization_7 (Batch	(None, 1, 1, 256)	1024
flatten (Flatten)	(None, 256)	0
dense (Dense)	(None, 33)	8481
dropout (Dropout)	(None, 33)	0
dense_1 (Dense)	(None, 33)	1122

Total params: 1,180,579
Trainable params: 1,178,691
Non-trainable params: 1,888

Figure. 2.2 Architecture of CNN Model

(iv). Training:

The heat map images generated were of the order 432*288 pixels, before starting the training of the model they were reduced to 244*244 pixels. The CNN model makes use of 3,084 samples from 33 labels of tumors. The samples are split in the ratio of 20:80 for testing and training respectively.

(v). Performance:

The accuracy of the model is 73.87% after 50 epochs.
The accuracy & loss charts for the test and training data are displayed in Figure. 3. The accuracy, precision, recall, F1-Score and Cohen Kappa Score are shown in Figure. 4. The precision, recall and F1-Score for each of the 33 cancer classes are given in Figure. 5. The overall accuracy of the model is given in Figure. 6. The confusion matrix is given in Figure. 7.

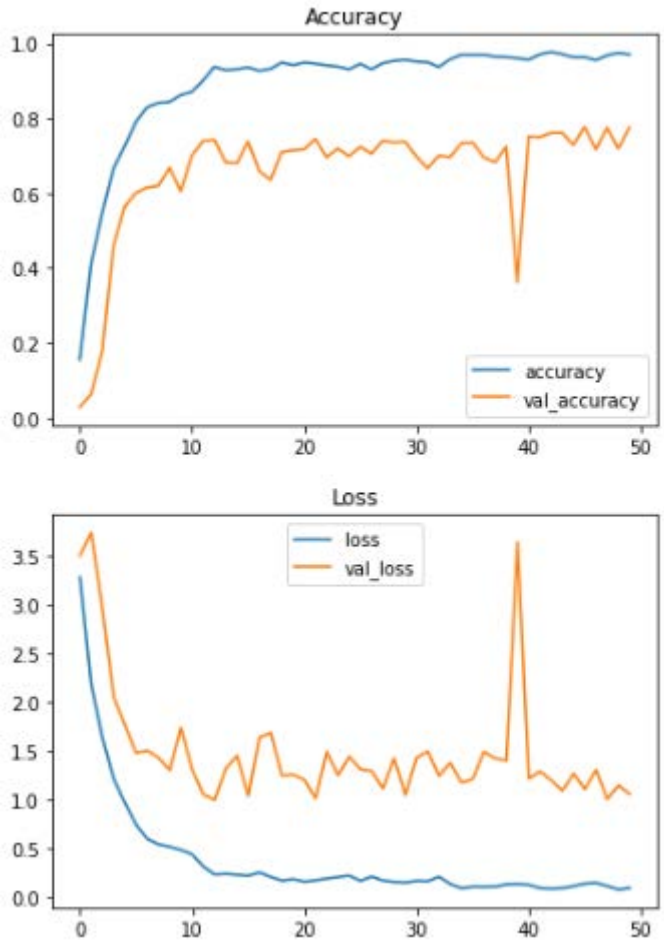


Figure. 3 Accuracy and Loss charts for test and training data
Note: Blue represents test data and orange represents training data.

```
Accuracy: 0.73866
Precision: 0.77896
Recall: 0.73866
F1 Score: 0.74174
Cohen Kappa Score: 0.73023
```

Figure. 4 Accuracy, Precision, Recall, F1 Score &
Cohen Kappa Score

	precision	recall	f1-score	support
ACC	0.83	0.75	0.79	32
BLCA	0.64	0.87	0.74	31
BRCA	0.96	0.92	0.94	26
CESC	0.60	0.71	0.65	21
CHOL	0.50	0.80	0.62	10
COAD	0.88	0.74	0.81	31
DLBC	0.36	0.45	0.40	11
ESCA	0.53	0.82	0.65	28
GBM	0.57	0.90	0.70	31
HNSC	0.75	0.82	0.78	33
KICH	0.72	0.69	0.71	26
KIRC	0.92	0.85	0.88	26
KIRP	0.74	0.77	0.75	30
LAML	0.92	0.86	0.89	28
LGG	0.89	0.83	0.86	30
LIHC	0.90	0.49	0.63	37
LUAD	1.00	0.64	0.78	28
LUSC	0.78	0.66	0.71	32
Meso	0.45	0.73	0.56	26
OV	0.77	0.71	0.74	28
PAAD	0.84	0.66	0.74	32
PCPG	0.83	0.54	0.65	28
PRAD	0.89	0.86	0.88	29
READ	0.63	0.76	0.69	25
SARC	0.95	0.95	0.95	37
SKCM	0.81	0.63	0.71	35
STAD	0.88	0.59	0.71	39
TGCT	0.63	0.92	0.75	26
THCA	0.71	0.75	0.73	36
THYM	0.92	0.71	0.80	31
UCEC	0.93	0.54	0.68	26
UCS	0.75	0.38	0.50	16
UVM	0.47	0.90	0.62	21

Figure. 5 Precision, Recall and F1-Score for each of the 33 cancer classes

accuracy			0.74	926
macro avg	0.76	0.73	0.73	926
weighted avg	0.78	0.74	0.74	926

Figure. 6 Overall accuracy of the model

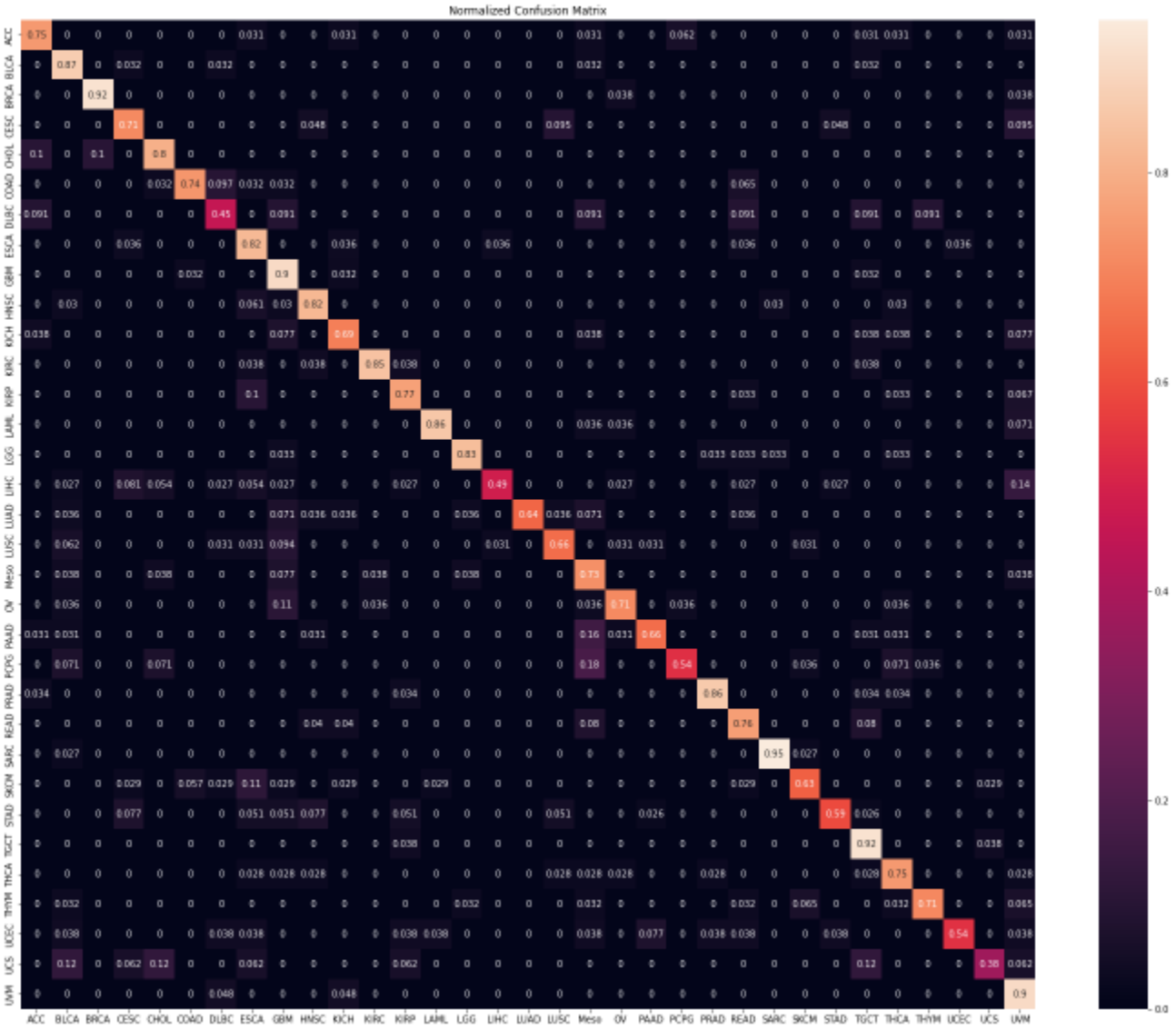


Figure. 7 Confusion Matri

V. RESULT

Accuracy of the CNN Model is 73.87%.

VI. CONCLUSION

Cancer has several subtypes, identification of these subtypes in a quick and efficient manner is crucial in the treatment of cancer patients**.** The deep learning based CNN model that has been implemented in this paper has been tested on the TCGA RNA-Seq dataset. This method provides a test accuracy of 73.87% on this multiclass dataset.

VII. ACKNOWLEDGEMENT

The authors would like to thank the Department of Science and Technology, Government of India for supporting this research with the grant DSTICPS 2018.

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IOT BASED AUTOMATED HORTICULTURE FOR FARMERSAND ANIMAL DETECTION

Roopesh Kumar H, Bhaskar Reddy P.V

School of Computer Science and Engineering,
REVA University, Bengaluru.

Abstract.

India is the harvest developing based country. Our old publics totally relied upon the cultivating understanding. Horticulture is a reason for living of standard Indians and has extraordinary control on the economy of the country. In dry zones or experiencing the same thing of lacking precipitation, water system comes to be troublesome. Along these lines, it needs to be compulsory for right produce and estimated by any stretch of the imagination for rancher insurance. Cultivation is a sub-area of agribusiness which assumes critical part in economy, human sustenance, orientation mainstreaming and business. Green wares incorporate natural products, vegetables, blossoms, flavors and toppings, which have developed consistently and transform into a significant fragment in agrarian exchange. The target of Horticulture framework is to keep measure on food security and the point of programmed water system control framework is to limit the endeavors of the human administrator (nursery worker) in Horticulture exercises. This control framework is worked around Arduino customized utilizing installed C language. Additionally involving GSM innovation for sending message on administrator versatile about siphon status. By utilizing this strategy can undoubtedly know the information without sitting around idly.

Keywords— Horticulture ,Cultivation.

1. INTRODUCTION

Cultivation items; e.g., particularly vegetables like red stew, red onion, tomatoes, potatoes; are fundamental rural produces in the food supply needs in India. These items are a huge issue due to visit cost variances in the Indonesian market. The progress of agriculture development is exceptionally reliant upon environment and ecological factors, for example, neighborhood microclimate, groundwater content, the temperature of the development climate, dampness, and light power.

Hence, fundamental to foster advances can tackle these issues and guarantee the agriculture in Indonesia turns out to be more useful both in quality and amount[7]. Already, a few examinations have been introduced in which they applied IoT-based strategy for working on cultivating. Notwithstanding, an investigation of IoT-based agriculture that fits with Indonesia condition, in a miniature environment cultivating climate and ready to be incorporated with insight microclimate cultivating is as yet deficient Prologue to installed framework:

An introduced system is portrayed as combo of each programming. A generally strong meaning of embedded structures is that they are contraptions used to control, show screen or help the errand of mechanical get together, hardware or plant. Embedded mirrors how they are a critical digit of the system. At the decision over the top an all around important PC may be related with control the interruption of a huge complex[8]. An introduced structure is a system which will finish a predefined closed attempt is the introduced structure and is even portrayed as mix of both programming and gear. A totally huge meaning of embedded systems is that they are contraptions used to control, screen or help the errand of mechanical gathering, equipment or plant. Introduced mirrors how they are a fundamental piece of the development. At the other astonishing an all around significant PC may be used to control the movement of a sweeping complex planning plant, and its epitome will act ordinarily clear.

The unimaginably most clear installed frameworks are ready for performing just a solitary breaking point or set of capacities to meet a particular destined reason[9]. In extra inconceivable frameworks an application program that empowers the installed construction to be utilized for a specific clarification in a particular application picks the working of the presented structure. The capacity to have programs proposes that a comparative inserted design can be utilized for a wide extent of purposes. Here and there a chip might be sorted out with the ultimate objective that application programming for a specific clarification can be added to the focal programming in a subsequent procedure, after which it is absurd to expect to complete extra improvements. The applications programming on such processors is at times proposed as firmware.

Implanted frameworks are set up in cells, computerized cameras microwaves, replying mail, home security framework, clothes washers, lighting framework, fax machines, copiers, printer, and scanners, sales registers, alarm framework, robotized teller machines, and numerous different gadgets.

It comprises of chip, RAM and glimmer memory and so on programming in inserted framework isn't that simpler like PC programming. It is by all accounts like programming in 15 a long time back PCs[10]. The equipment for the framework is ordinarily settled to make the contraption as low-valued as could be anticipated in light of the current situation. This infers the computer programmer should manage with moderate processors and low memory, while meanwhile doing battling a necessity for viability not seen in most PC and misstep message style troubleshooting Assets

2. RELATED WORK

In this paper “IoT Applications in Smart Agriculture: Issues and Challenges”[1]. Accuracy agribusiness assists with working on the job of the ranchers via mechanizing and improving all possible agrarian boundaries in request to improve the agrarian development and efficiency. IoT sensors help to quantify soil quality, atmospheric conditions, dampness level, and at long last advance these boundaries to build the yield.

In this paper “Blockchain Smart Contract for Scalable Data Sharing in IoT: A Case Study of Smart Agriculture” [2]. In this method in a shrewd horticulture system, it comprises of 4 levels: shrewd horticulture, brilliant agreement, Interplanetary Document System (IPFS)

and horticulture partners (distant clients). This paper makes sense of exhaustively the various parts of our proposed engineering. Our methodology utilizes unknown personalities to guarantee clients' security. Our methodology is completely versatile on the grounds that an enormous number of asset proprietors can utilize their information sharing savvy agreements to make, update or erase information sharing approaches.

In this paper “On the Application of Internet of Things in Smart Agriculture” [3]. The dirt dampness content is decided by the on location discovery of soil information, and afterward the smart control framework is applied inmix with the IoT to control the dirt water system framework rom a distance, shaping a smart location, judgment and dynamic framework for horticultural water system framework. The IoT can understand the ongoing sharing of soil dampness information furthermore, the trading of data between various the executives offices. In the plan of insightful water system, remote transmission innovation, sensor innovation, information capacity innovation and computerized reasoning calculation are coordinated to finish information assortment, information transmission, information saving and calling, information screening, smart information handling, programmed water system control and amicable human-PC interaction

In this paper “Virtual Fencing using Yolo Framework in Agriculture Field” [4]. In the recent years many pests are explicit problem thus forward actually infest crop slowly day by day. It is an common issues for the ranchers. So to overcome this In this adventure a perception raspberry pi cam and vibration devices are being used. The rancher can monitor and observe if there is any pests in the agribusiness field, without his actual being present in the field. Rancher will be able to look at it from a distant environment with a notification by his progressed cell phone.

In this, “A Survey on Privacy-Preserving Blockchain Systems (PPBS) and a Novel PPBS-Based Framework for Smart Agriculture [5]”. It gives a brief idea foundation regarding blockchain, frames and difficulties in the blockchain system as they connect with protection, and then, at that point, characterizes into regions in which this worldview can be applied to increment or safeguard protection. These regions are digital currency, information the executives and capacity, e-casting a ballot, IoT, and savvy horticulture. This work provides another protection safeguarding structure planned unequivocally for the issues that are available in savvy horticulture.

In this paper, “Smart Village: Solar Based Smart Agriculture with IoT Enabled for Climatic Change and Fertilization of Soil [6]”. Here an insightful framework of the reality faced by ranchers gaining the important insights in treatment of the agribusiness land and by conveying environment day to day changes data by IoT medium. The data being collected can be accessed by mobiles. To reduce the burden of farmer understandings all the data connected with soil treatment and climatic conditions is being conveyed according to there local language medium of their advantage. By this framework it assist its individuals with teaming up what's more, take it to one more degree of prerequisite in working on their creation limit. These IoT gadgets are worked by the same token through sun powered charger or electric stock fittingly to adjust the power necessity across the field.

In this “Smart Village: Solar Based Smart Agriculture with IoT Enabled for Climatic Change and Fertilization of Soil ”[7] IoT technology is implemented in real time with respect to real time monitoring of data obtained from the sensors placed in agriculture field and based on data obtained it can be used to improvise the planting conditions and simultaneously improve the quality and efficiency.

3. EXISTING SYSTEM

In the Existing System, individuals used to check and confirm the dampness content in the fields physically. This is extremely challenging and risk cycle to really look at the condition in the mid-night. Despite the fact that the environment is great the stickiness is obscure, so in the past framework we have a few impediments

Drawbacks: This is undeniably challenging and risk cycle to actually take a look at the condition in the mid-night

4. PROBLEM STATEMENT

**Water is vital for the development of plants yet unreasonable water system of field prompts water logging of soil. An excessive amount of water is hurtful for crop creation as talked about under:

It hinders the course of germination of seeds. This is because of over the top water in the field, which influences the dirt air circulation. Roots don't fill as expected in a waterlogged field. . Exorbitant water in the field brings about salinization of soils. The extreme water system might prompt housing of the yield, may fall on the ground under the impact of solid breezes. Because of overabundance water the foundations of the plant will most likely be unable to give important jetty in the wet soil. This additionally brings about squandering of costly water

5. OBJECTIVES

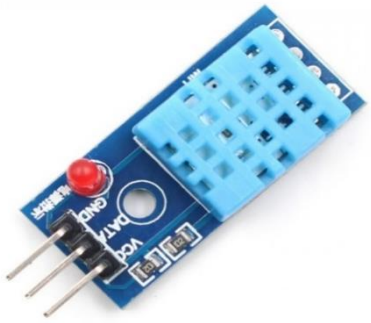
- To concentrate on the current examples and issues related with it for water the board
- To track down shrewd answers for the issue of over-water system
- To figure out attainability of Smart Horticulture in India

6. HARDWARE COMPONENTS

1. SOIL MOISTURE SENSOR

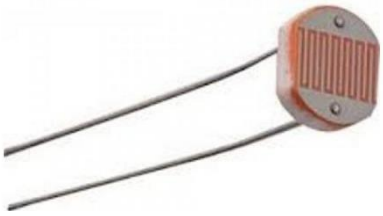
Soil moisture sensor is used in testing the current moisture level of the soil and passing the information to the Arduino.

2. DHT11 SENSOR



DTH 11 sensor is used in measuring the temperature, humidity and passing the information to Arduino

3. LDR Sensor



LDR sensor are used to detect the presence of light

4. IR Sensor

It is used in sensing surrounding environment

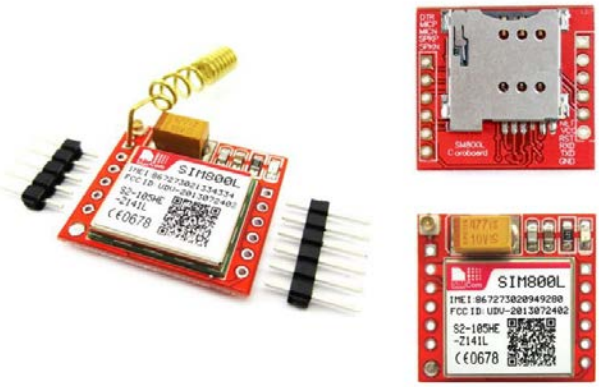
5.DC WATER PUMP

It is used in supplying water to the agriculture field

6. LCD Display

LCD display is used in showing current status of the system output

7.GSM



GSM modem is used in sending messages, this helps in triggering alerts to the people instantly

7. METHODOLOGY

Various sensors like soil dampness, DHT11, IR (gatecrasher discovery organization) are associated with Arduino microcontroller's feedback pins inside this gadget. The detected sensor values are shown in LCD. Assuming that the detected worth surpasses the edge values set in the framework, the transfer circuit consequently turns the siphon ON/OFF and it is associated with the driver circuit which assists with exchanging the voltage. The rancher will be suggested by means of GSM module about the ongoing state of the field. By utilizing this gadget, the rancher can whenever access the subtleties of the field condition anyplace. Any unwanted pests is detected by IR and message is passed by GSM and which gives an alarm to ranchers right away.

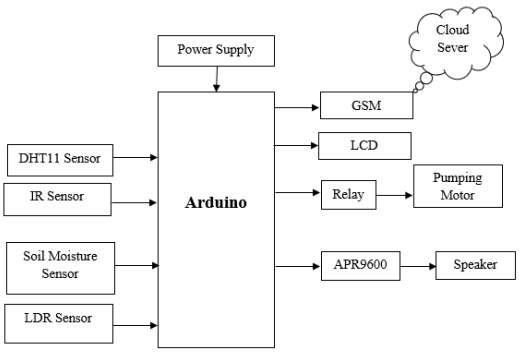


Figure 1: System Architecture

This Horticulture framework utilizing IOT framework is controlled by 12V Adapter to Power supply Board and from that point we will take required power supply by utilizing controller, it comprises of Temperature sensor, IR Sensor. At the point when the IOT based Horticulture observing framework begins it really takes a look at the Temperature, dampness and creatures. In the event that temperature distinguishes high, it naturally begins the water siphon. In the event that the temperature goes over the level, transfer it to cloud. This everything is shown on the LCD show module. This everything is additionally seen in IOT where it shows data of Humidity, Temperature. Temperature can be set on a specific level; it depends on the kind yields developed. On the off chance that any Animals is identified, sound is given utilizing speaker module. The creature identified by the IR Sensor.

NEED FOR EMBEDDED SYSTEMS:

As of late the original items got the market are involving the installed PCs in various ways. The livelihoods of introduced systems are essentially limitless, considering the way that reliably new things are familiarize with the market that utilizations embedded PC in original strategies for late, devices like chip, microcontrollers and FPGA chips have twisted up significantly less exorbitant. A more intelligent thought is to purchase a

nonexclusive chip and create guarantee show programming or program for put into a preparation a clever control
Making particularly planned chip to deal with a particular endeavor a particular comprehension or set of tasks expenses fundamentally a greater amount of an open door and money. Various inserted machines even go with expansive libraries, with an objective that arrangement of your own specific programming transforms into a very immaterial task in actuality. According to a use viewpoint, there is a genuine qualification between a PC and inserted frameworks. Embedded installed frameworks are every now and again expected to give Real-Time response. The principal parts that make inserted systems amazing are its dependability and straightforwardness in troubleshooting.

8. RESULTS AND DISCUSSION

Arduino goes about as the primary regulator

as the dampness sensor distinguishes lesser dampness in soil underneath avg=99 the engine was turned on consequently and a sms was shipped off the famers with respect to the status and the engine stays in "ON" state except if and until it comes to avg=100 and it switches off naturally,the principle point is to primary a steady dampness content, the dampness boundaries can be changed.

The development of interlopers and nuisances was followed by DTH11 and PR sensor effectively and promptly it passed an order to the bell caution and sent a sms to the rancher by gsm module and a similar data will be passed by speaker for alarming.

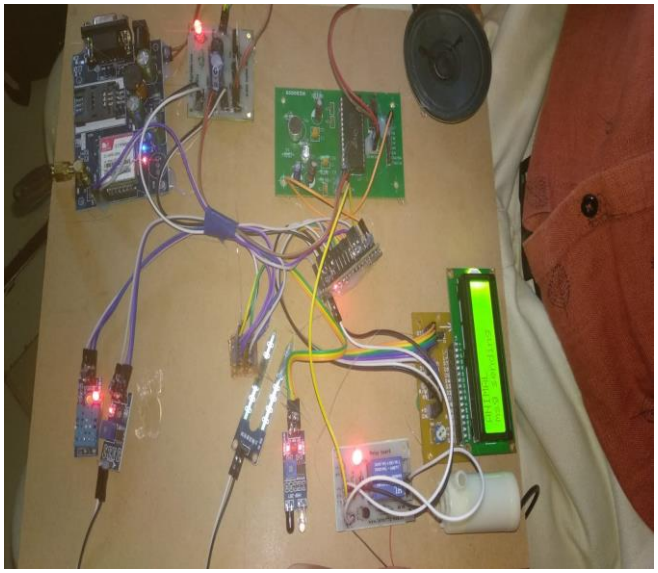


Figure 2.1: Project system

Fig:2.1.2: Moisture Percentage

Fig:2.1.3: Display Title

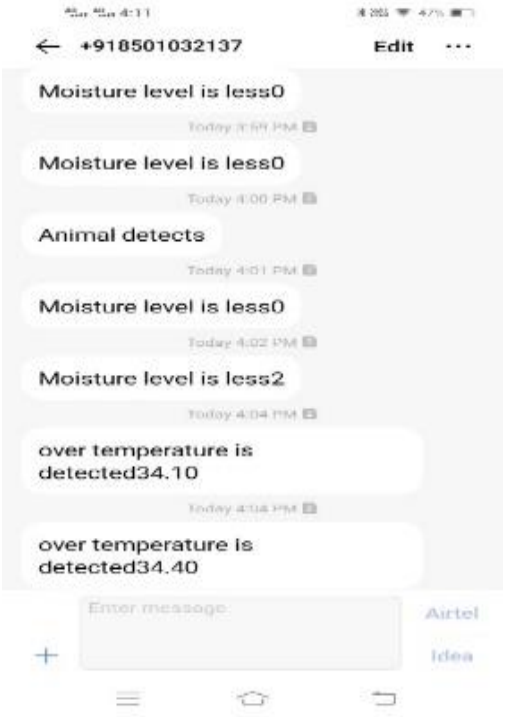


Fig:2.3: GSM Alerts

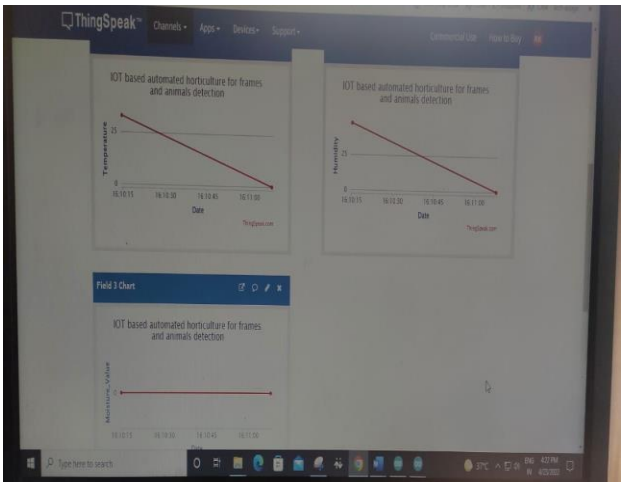


Fig:2.4: Data Monitoring

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Design and Development of News Droid App for Android

Naveen Ghorpade[1*]
Nalluri Bhargavi[1]
Peta Hima Sai[1]
Potluri Tarun[1]
Pilla Sai Charan Reddy[1]*1*

School of Computer Science and Engineering
REVA University
Bengaluru
India-562149
naveen.ghorpade@gmail.com*

***Abstract*—** We already have rapid connectivity and systems which enable everyone to wirelessly sync with each other as the globe's tech advances. Cell devices, iPad, and computers are becoming more popular every day, and the majority of the population currently own them. We need to keep up with every incident and news in this fast-paced, information-driven environment. We look for news on a daily basis since it is crucial information. Highlights, match reports, public announcements, advertisements, and price variation reports relating to business/assets are all examples of news. Various news outlets in India and throughout the world broadcast live news every minute. This article focuses on the creation of a News app, which is an Android smartphone application that provides users with the most up-to-date news from over 120 newspapers in over 50 countries. The primary purpose of this app is to connect media articles from across the world and deliver them to users as swiftly as possible in the finest visual manner available.

Keywords—News app, Flutter, Android, Studio, Firebase

1. INTRODUCTION

Public News Droid is an advanced and informative system that allows users to keep up with the latest news, articles, and other relevant events in their area. This system allows the general people to stay informed about what is going on in their area, locality, or city[1-4]. This system requires two applications to function: one for the administrator and one for the user. The user can only see news from his own city, but he or she can add news from any city. If any abusive, irrelevant, or fake news is added by any users, the administrator will monitor it and take appropriate action [5-6].

Flutter is used for the front end, and Firebase issued for the backend. To use this app, the user must first register with the system and then update his information. The most recent news is displayed first, and so on. The user can also refresh the news, which will display the most recent news first and close the current news [7-12]. A picture and a title connected to the news can be added by the user. The system allows a swipe to advance to the next or previous news with transition effects, making reading the news lively and fantastic [13-22].

There are several sections to this application. It begins with a literature review, then move on to a discussion of the technique utilized, then a description of the analysis or pre- questionnaire, design and development, and finally system evaluation. The application closes with a summary of the research effort, as well as its shortcomings and potential improvements [23-35].

2. OBJECTIVES

The objectives of this work is twofold, i.e.,

A. The main goal of this project is to create an Android-based news app using open-source technologies, as well as to integrate backend and server-side programming with the android app.

B. Create an app where users can register, see news, and post news to the community on their own, so that everyone can keep up with what's going on.

3. METHODOLGY

In this step, everything that could jeopardize the venture or a portion of it is screened; in other words, the hypothesis is tested through use to ensure that the information in the framework alters in accordance with the arrangement. The project manager connects all of the equipment and stages involved with the express objective of monitoring and extending plans and keeping oneself in control. The following are the steps for using each of the devices: Carry out the activities as planned. All effort, changes, and outcomes should be documented and reported. Analyze the impact of the activity or adjustments done in accordance with the plan [36- 40].

Public News is an advanced and informative system that helps clients keep up with the latest news, articles, and other

interesting events in their area. This system allows people in the immediate vicinity to stay informed about what is going on in their region, area, or city. This framework requires two programs to function: one for the administrator and one for the user. The client is only allowed to access news from his own city, but he or she is free to add news from any place. If any mishandling, unimportant, or fraudulent news is included by any clients, the administrator will investigate and take appropriate action [41-46].

Android Studio was used for the front end, and SQL Server for the backend [7-12]. To use this application, the client must first register with the framework, after which he can update his points of interest. The most recent news is displayed first, and so on. The client can also re-energize the news by selecting the most recent one displayed first, and the current news will be closed. A photo and a title associated with the news might be included by the client. The client can address the news in more than 450 words. The look and feel of reading the news is energizing and amazing, as the framework allows you to swipe to the next or previous news with change effect

A. Features of this design

- There is no cost associated with the development of this work.
- This work makes use of open-source tools.
- The backend is a pay-as-you-go option, with a free plan available up to a specific limit.

B. Design and Development

We presently have features such as corporate stream, social stream, and blog stream in this app. Each stream is significant in its own right. Corporate news, such as news on MNCs, startups, and so on, is brought to you by Corporate Stream.

The social stream provides updates on social media sites such as Meta, Instagram, and others. The blog stream, on the other hand, contains information about AI, Covid 19, and other topics in the form of blogs.

Flutter is used to create the frontend design and development. Google created the Flutter framework. Firebase is the backend used. Backend as a service platform Firebase allows you to manage your backend without writing a single line of code. Firebase provides a number of features, including Firebase Auth, Firebase Database, Firebase Realtime Database, Firebase Storage, and Firebase Cloud Messaging [13].

We are using Flutter which is integrated with Android Studio. The Flutter Fire dependencies used in the project. It's a Software Development Kit that makes it simple to connect to Firebase.

The app looks for a Firebase Auth Token in the splash screen and tries to refresh it if it exists. If the Firebase Auth Token expires, the app will redirect you to the sign-in screen.

If the user already has a database account. He or she can sign in using their username and password, and then be taken to the main page after verification.

If the user does not have an account, he must establish one with a username and password. The user's account will be established after giving a username and password. The user will be able to access the homepage, where he will be able to switch between corporate, social, and blog streams.

All of these streams are linked to the database in the backend. When news is updated on the server, it is updated in real time in the application.

A list with a news thumbnail, title, and description is formed. It is used across all tabs. When the apps plus button is pressed. By giving an image thumbnail, title, and description, the user will be able to produce news. The image will initially be saved in Firebase storage. We will be able to obtain a download URL once the image has been successfully uploaded, and the URL, as well as the image title and description, will be saved in the firebase fire store under the chosen category.

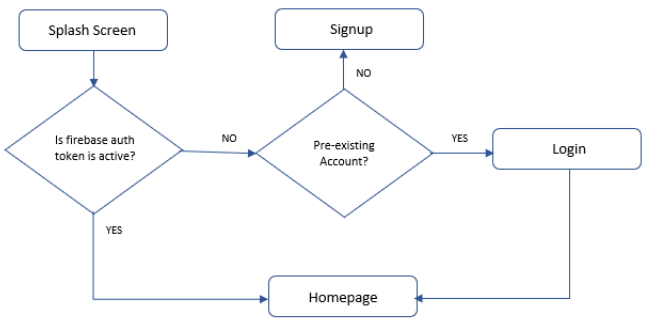

Fig.1. Block Diagram of Layout

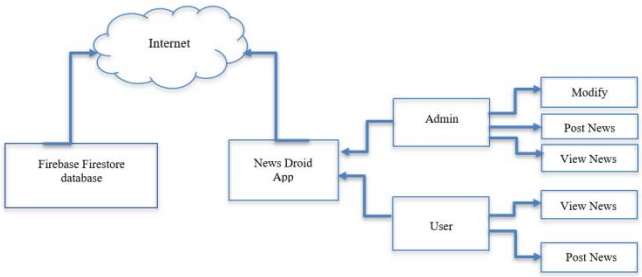

Fig.2. Flow diagram of the entire work

4. RESULTS

The Fig.3 to Fig.7 shows the results of this work.

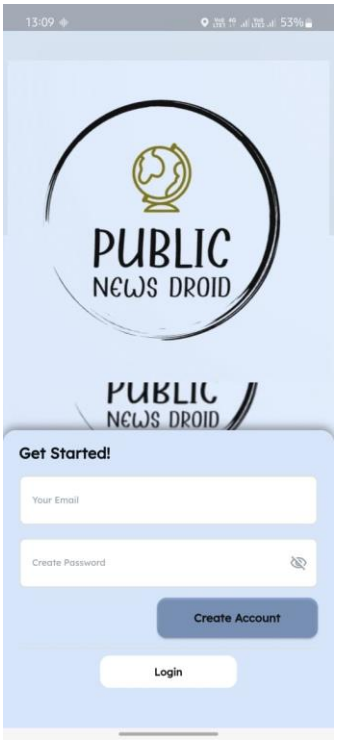

Fig.3. Login/Signup Page

The Fig.3 shows the login/signup page of the application where the user can enter their email and password to either login or to sign up on the application. When the user signs up, a new user credential is created in the remote authentication server which stores the user entered details for later validation. When the user logs in, the entered credentials are validated over the existing credentials in the authentication server and the user will be allowed to login when the authentication is successful.

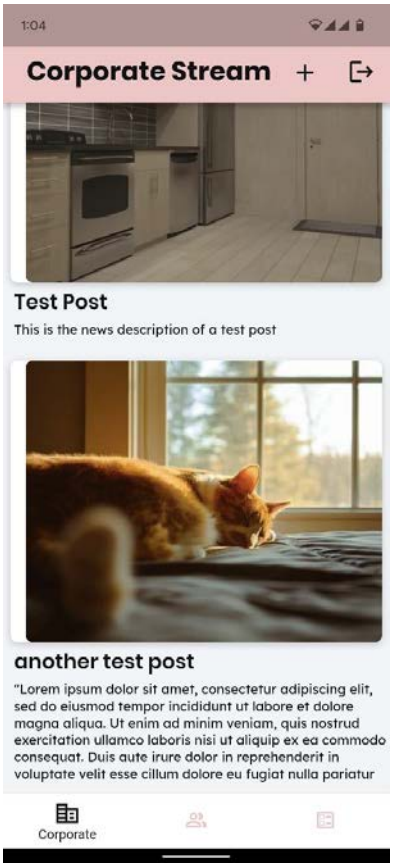

Fig.4. Corporate Feed Page

The Fig.4 shows the homepage the user is redirected to after logging in, this picture highlights the corporate news which has all the news articles from around the user in the field of social. The user can scroll through the articles and get insights about the incidents happening.

The Fig.5 above shows the homepage the user is redirected to after logging in, this picture highlights the social news which has all the news articles from around the user in the field of corporate. The user can scroll through the articles and get insights about the incidents happening.

The Fig.6 shows the homepage the user is redirected to after logging in, this picture highlights the blog posts which have all the blogs uploaded. The user can scroll through the articles and get insights about the incidents happening.

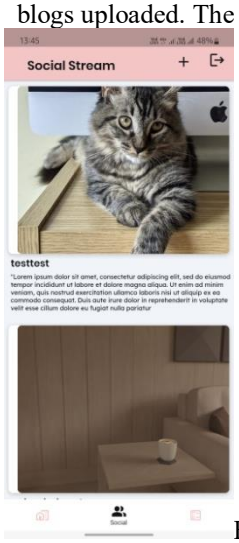

Fig.5. Social Feed Page

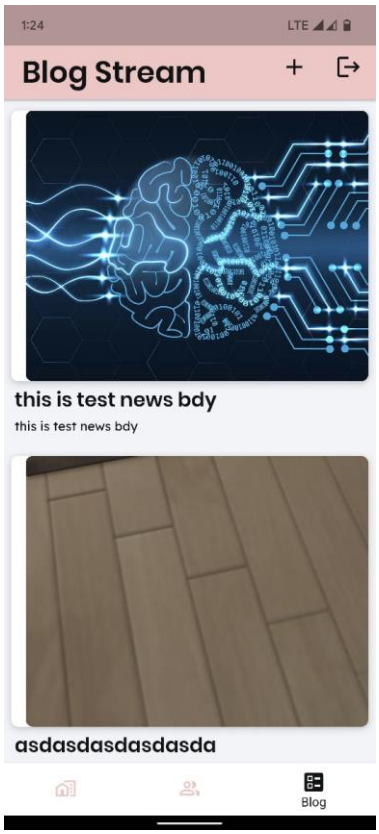

Fig.6. Blog Feed Page

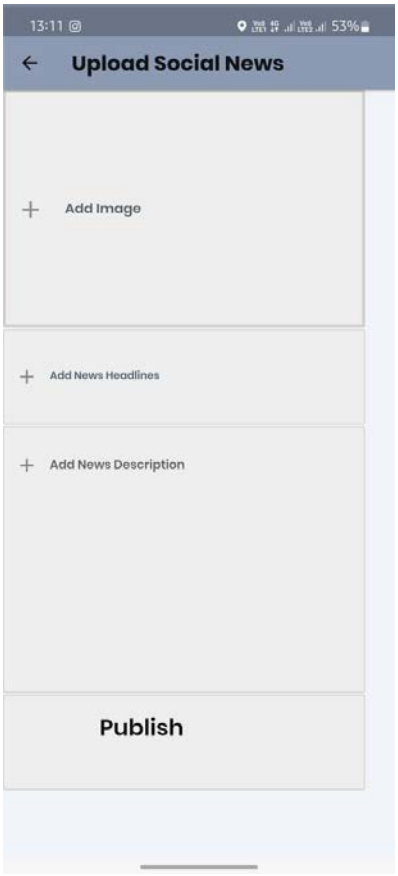

Fig.7. Add Post Page

The Fig.8 above shows the add post page which is different for all the 3 genres. The user on this page can upload images related to the news article they want to share, give headlines to the news and also write a description to the article to give more information about the post. Once the user clicks on share, the article will be updated to the feed of all other users on the app where they can access the news articles.

5. CONCLUSION

With the growing population, there is much that the news channels are unaware of, either intentionally or unintentionally, and in order for this information to reach us, we need a medium that allows citizens to speak out about what is going on in their communities, and this information should be available for all of us to view and share.

The android application is designed to reduce the distance between people. In our project, we create a news app that specifies news according to their categories i.e. sport, technology, politics, studies, etc. This news app is able to keep totally updated news for their users. A specific notification for some important news is generated even though the app is not opened. Thus, our android app can be implemented as a smarter solution.

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A Review on Accessibility Evaluation of numerous E- commerce platforms for the visually impaired users

Sanskar Jain[1], Esha Tazmeen[2], Avinash Vyas[3], Papri Bhattacharjee[4], [5]Dr. Vani Krishnaswamy

[1]R19CC055@eee.reva.edu.in, [2]R19CC016@eee.reva.edu.in
[3]R19CC007@eee.reva.edu.in, [4]R19CC032@eee.reva.edu.in
[5]Associate Professor, School of Computer Science and Engg, REVA University Bangalore -560064
[5]vanikrishna.s@reva.edu.in

Abstract.

The establishment of online shopping website has brought a positive impact not only in the global market but has also made the act of buying and selling an effortless chore for all the individuals .With the boundless amelioration in technology, it is desired that the e-commerce websites should have an approachable look and should be easily attainable to the incapacitate individual. The motive of this study is to assess the versatility of three e-commerce websites i.e. Amazon India, Myntra and Snapdeal and to figure out the complications faced by the users suffering from Glaucoma, Cataract and Diabetic Retinopathy particularly. This study also discovered the use of simulator namely the "ViaOpta Simulator for easy analysis of these websites based on the mentioned defects. Through this detailed study, we can conclude that none of the big e-commerce websites are focusing on the guidelines mentioned by WCAG.

Keywords--E-commerce, disabilities, accessibility, usability.

1. INTRODUCTION

E-retailers communicate with all the online costumers and seek to provide optimistic procurement via e-commerce websites. We have collected data from various e-shopping websites and evaluated the data based on user experience associated with different vision disabilities. This research will benefit both the owner and the consumer, the owner in terms of monetary gains, and the consumer in terms of accessibility. This research will also provide an insight into people suffering from disabilities like Glaucoma, Cataract, and diabetic retinopathy. Websites designed nowadays are by human-computer interaction which are easily attainable to all the costumers irrespective of their ages and disabilities, by taking into consideration the two concepts- accessibility and usability. Users with affliction often undergo many challenges due to their physical disability which restricts them from going for manual shopping. As per the law, people with disabilities should possess equal access to shopping websites. E-commerce has set off as a vital platform providing ease for anybody to shop online. The business-to-consumer (B2C) website engrossed the consumers to

purchase the products online without any physical barriers. B2C has created a massive change in the global market by generating more revenue in comparison to offline shopping. B2C is furnishing easy access, and at the same time gives an actual and appropriate shopping experience to the costumers. The World Wide Web Consortium, for example, provides accessibility for people around the globe including those with disabilities such as color blindness, deaf users, and age-related vision problems. E-seller can dodge lawsuits in the coming times by evaluating the web accessibility of online stores now and probably designing accessible websites [1, 2].

Our contribution is to learn how to measure the adaptability of three different e-commerce websites i.e. Amazon India, Myntra and Snapdeal by the visually impaired users like Glaucoma, Cataract and Diabetic Retinopathy particularly. We have performed this easy analysis of these websites based on the above mentioned defects using a simulator namely the "ViaOpta Simulator.

This study is structured as follows: Section II offers background and related works. Section III presents methodology of research. Finally, Sections IV and V provides results and conclusion respectively.

2. RELATED WORKS

Online shopping is the latest and the greatest craze in the history of marketing, which enables consumers to purchase goods within a short period with minimal effort. However, prior studies have shown that incapacitated individuals go through a series of problems while shopping online. With the advancement in technology, new techniques such as JavaScript, and HTML have been introduced to improve the visual platform, hence making it easier for all the users to interact and fulfill their needs. Howbeit, the websites were associated with many drawbacks, especially for users suffering from various impairments which covered almost 15% of the total population according to the World Health Organization. The Web Content Accessibility Guidelines have been framed for B2C automated web services to improve the web accessibility for people suffering from disabilities. These websites provide users with multiple options such as screen readers, voice recognition, and alternative website displays along with pointing devices. [1]

The interoperability analysis of E-commerce websites is performed by taking into consideration the three vital parameters- Performance, Accessibility, and Search Engine Organization (SEO). Thus, Usability plays a key role in determining the utilitarian behavior of virtual shopping. Myntra has attained the highest score in terms of performance and the most used online transaction app Paytm has been rated the highest in terms of accessibility.[3]

Usability is the degree up to which a user can utilize a product to attain his/her goals. depends on several factors namely: understandability, capability, notability, inaccuracy, and contentment. The elements of usability can be listed as feasible, climatic, sentiments (friendly interface), and the details. A B2C business more commonly called electronic retailing anticipates effortless purchases along with providing security for the user's personal

information at the time of transactions, which is, otherwise, at high risk from hackers. A user's positive experience produces a constructive effect on the company's accomplishment in digital marketing. Research conducted on the online store thepoplook.com originating in Malaysia, which offers complimentary deliveries by means of fast courier services to its customers within the same country, has shown that this method resulted in a boost in sales and allured more buyers. The significance of cyber shopping experience is enabling the consumers to purchase the commodities smoothly.[4]

The studies which evaluate the usability of e-commerce websites mostly have two methods: user testing and heuristic evaluation. Further, the study of these two methods did not offer any drawbacks and advantages. The structure for the assessment of online shopping website involves user based and a evaluator based method with Google Analytics software. This structure involves steps to provide quick and easy access for checking the problematic area on websites and their specific pages. The framework offers user testing for identifying specific major problems such as map-reading, blueprint, acquirement, availability, and client service, while the evaluator based method is good in finding minor usability problems such as map-reading, internal search, and design, site architecture availability, and customer service. The framework was tested and the outcome indicates its functionality in raising awareness. This helps the e-commerce website retailers to grow, survive and achieve success. [5]

The importance of usability of websites, e-commerce standards has been identified everywhere in the world [15, 16]

The authors in this paper [17] have compared the errors in usability and accessibility between African Europe e-commerce websites by using the automated tools

3. METHODOLOGY

The empirical method utilized for computing website usability is data interpretation. Therefore, the data evaluation outlook is used to inspect net usability in the context of online shopping websites [1]. The main tool used for this study is Indian Business to Consumer (B2C) referred from e-commerce websites. After the deletion of unimportant links, the remaining top 5 B2C online shopping websites were concluded for evaluation.

Instrumentation

Investigation was performed using a self-operating mobile application called 'ViaOpta Simulator' of version 2.4.3. ViaOpta Simulator was developed with three major European associations namely European Council Optometry and Optics, European Men's Health Forum, and AMD Alliance International. It was launched on January 8th, 2014 [6, 11] ViaOpta Simulator identifies the following disabilities:

- Glaucoma
- Cataract

- Diabetic retinopathy
- Dry eye
- Presbyopia

We have taken into consideration 3 e-commerce websites: Amazon India, Snap deal, and Myntra [7].

Amazon India- Amazon India is the most trusted and valuable e-commerce website for Indian online consumers. According to Amazon India, the estimation of website visitors is 322.54 million monthly. [7].

Snapdeal- Snapdeal is an Indian e-commerce platform established in February 2010 in New Delhi, India. Initially, the company was started as a coupon and deals site and later turned out to be a variety shopping platform having 30 million products and 40.15 million monthly active users. [7]

Myntra- Myntra is the largest e-commerce marketplace that deals in fashion, lifestyle, and home-related products. The estimation of the monthly users is 48.03 million. [7]

As per our study, we have considered a few disabilities like Glaucoma, Cataract, and Diabetic retinopathy.

Glaucoma is the result of damage to the optic nerve due to high eye pressure. Every year, over 1 million cases are recorded in India [12].

In **Cataract**, the lens of the eye gets cloudy. It develops over the course of a year. The main symptom is blurry vision [13].

Diabetic retinopathy affects the eyes of human beings, it is caused due to the damage of the blood vessels at the back of the eyes. The symptoms are blurriness, floaters, and dark areas of vision [14].

3.1 Procedure

The vast improvement in technology had called for the need of development of many impairment software which is available today worldwide in order to eradicate the afflictions that an incapacitated individual especially the ones with vision disabilities goes through. Consequently, we have performed our research taking into account an augmented reality application namely the "ViaOpta Simulator" in order to discover the complications that the individuals suffering from Glaucoma, Cataract, and Diabetic Retinopathy face while browsing through the E-commerce websites namely Amazon India, Snapdeal and Myntra which we have considered for this particular research.

Firstly, the introductory pages of these chosen shopping websites were thoroughly examined so as to obtain acumen in the direction of the drawbacks that these webpages might carry. An accessibility check was performed on all the webpages of all the three websites by entering the URL of each of these webpages into the required field and testing the compliance of these websites to Web Content Accessibility Guidelines 2.1.

The ViaOpta simulator was then employed to check the ophthalmic condition of the patients and it divided these vision problems into three levels-Level A (describes minimum level of conformance), Level AA (average level of conformance), Level AAA(maximum level of conformance) in accordance to the WCAG 2.1 which also divides the websites into different levels based on conformance. After prior testing, it was discovered that Diabetic Retinopathy comes under Level A, Glaucoma falls under Level AA, and Cataract comes under Level AAA. Thus, if a webpage had the lowest level of conformity it could not pass the trial, and if no mistakes, then this website is said to have passed the test.

4. RESULT AND DISCUSSION

According to the research, the above-mentioned online e-commerce platforms are paying the least attention to disabled consumers. We have found that these top online e-commerce platforms are violating the WCAG ("Web Content Accessibility Guidelines") contrast, checker. Hardly any of these mentioned websites have 0 accessibility violations [9].

The table below shows the accessibility violation on the home page: [9]

Name of the website	**Home page URL**	**Number of issues**
Snapdeal	http://www.snapdeal.com/External Website	160
Amazon	http://www.amazon.in/External Website	28
Myntra	http://www.myntra.com/External Website	26

The following are the observations made from the study for visually impaired users;

The accessibility of the Web is predominantly significant visually impaired users has ample struggle surfing the web. Hence images of the products have to be shown mentioning their usage and not looks.

Such as the usage of ALT-tags to let reader of screen to miss insignificant images.

Usage of small explanation for images.

Users with visually impaired can utilise screen readers such as Job Access with Speech (JAWS).

To study how to a screen reader for visually impaired users would vocally tell the text of a website, developers can utilise plug-ins of a Firefox plug-ins like Fangs Screen Reader Emulator

The designers can utilise Color Oracle software which is freely available [18].

Usage of tools for calculating active colour contrast ratio and evading the font of text with less resolutions and font.

We have evaluated that these websites should follow the mentioned ways to make their website accessible: [10]

1.	Provide enough color contrast.
2.	Limit color and don't rely on it.
3.	Avoid text over background images.
4.	Enable manual font size adjustment.
5.	Add relevant anchor text and alt text.
6.	Grant keyboard accessibility.
7.	Use clear and elaborative tags for links and buttons.
8.	Use titles to seek page content.

5. CONCLUSION

With that, we can conclude that none of the B2C e-commerce websites in India are concentrating on fulfilling the norms of the WCAG. With the rapid growth in online shopping in India, disabled consumers are in need of easy access to online shopping. Along with that there are various online evaluation tools for accessibility and the skilled evaluators may mention the varied accessibility errors while accessing such e-commerce websites.

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An Interactive Dashboard for Farmer's Assistant

Surina Saha, D Bhulakshmi, Vinita Pooja J, Sahana HS

School Of Computer Science and Engineering

r18cs431@cit.reva.edu.in, bhulakshmi.d@reva.edu.in, r18cs465@cit.reva.edu.in,

r18cs528@cit.reva.edu.in

Abstract

Fruits, vegetables, root and tuber crops, mushrooms, spices, and bamboo are all included by the Integrated Development of Horticulture scheme, which is funded by the government.

The main purpose is to support the holistic expansion of the horticulture sector, which includes bamboo and coconut, by implementing regionally specific area-based strategies that involve research, technological promotion, extension, post-harvest management, processing, and marketing.

Encourage farmers to form farmer organizations such as FIGs or FPOs and FPCs to take advantage of economies of scale and scope. Increase horticulture production, farmer income, and nutritional security to achieve this.

The "State Horticulture Mission" was successfully designed and quality-tested during this project. We achieved all of our objectives, and our project meets the organizational needs. For the request in question, the development would be used to seek, retrieve, and process the data. The machine has encouraged farm implementation, resulting in improved product quality and higher farming productivity.

While innovative technology is implemented, this system could be tweaked to meet the needs of the environment. Because it is based on an object-oriented design, any future changes will be simple to implement. Security could be enhanced by employing new technologies within the context of anticipated prospective challenges.

It is possible to include a built-in web browser. Emails can be given domain names. E-banking is an alternative worth considering.

Keywords— Farming Assistant, Horticulture development, Horticulture Sector, Farmer

1. INTRODUCTION

As we progress into the present era of technology, we may discover that many

engineering-related applications are quite valuable to society's advancement.

The State Horticulture Mission will have the authority to form an autonomous body that will be registered under the Societies Registration Act to carry out Mission programs at the state and district levels. They conduct baseline surveys and feasibility studies for specific areas/clusters (groups of districts) to assess the state of horticultural/bamboo output, potential, and demand, and customize support accordingly.

Receive monies for Mission activities from the National Mission Authority, the State Government, and other sources, keep accurate records, and provide a utilization certificate.

The State Horticulture Mission distributes funds to implementing organizations and oversees monitors, and reviews program implementation.

Farmers, societies, grower associations, self-help groups, governmental agencies, and other similar organizations are assisting and overseeing the execution of schematic operations in the states.

Farmers can better manage their crops and farms if they can share their positive and bad experiences with each other and with specialists. Digital agriculture, which makes use of internet communication technology (ICT), may make it easier for farmers to share their experiences with specialists and others interested in agriculture.
Many farmers, however, are still unable to afford ICT approaches in agriculture. Lack of connectivity, a lack of capacity building, and poor usability of ICT applications are the causes. We choose to address this issue with low-cost, simple-to-use ICT solutions based on infrastructure and services now available to small-scale producers in underdeveloped countries. We created and tested a unique technology using a participatory design approach.Farmers Assistant is a cost-effective. It has the potential to help farmers and agricultural practitioners better manage their crops and farms, minimize risk, boost productivity, and enhance their livelihoods.Farmers like to make decisions based on talks and their own experiences rather than accepting top-down generalized recommendations, therefore sharing experiences and knowledge is critical (Ingram, 2008, Wellard et al., 2013). Because farmers like to be involved in the decision-making process, extension agents' roles change: they become catalysts, facilitators, and promoters of knowledge development and exchange. The shift to Farmer-to-Farmer Extension is aided by these pluralistic extension systems (FFE). Their importance is growing, and they are now being used to supplement traditional extension services (Kiptot and Franzel, 2015, Rao, 2007).
The benefits of digital agriculture are obvious. However, we cannot simply throw ICT solutions at small farmers to deploy digital agriculture: we must create and build solutions in collaboration with farmers and facilitators in participatory projects.

2. LITERATURE REVIEW

In this domain, many pieces of literature on Farmer assistants have been published already and are accessible to the general public. A poll of farmers' leaders and unions was done to determine the challenges farmers confront in receiving funding and program benefits on

schedule.

The current application is a stand-alone application. It doesn't have a good user interface, and employees can only handle one request at a time on a single system.

If the farmers apply for a scheme in the system, they will not be able to accept another request. All of the processes are carried out by hand.

It was discovered that the majority of the farmers were dissatisfied with the fact that it was a lengthy, time-consuming process that was primarily done manually, resulting in extra downsides. So we talked to the leaders of the farming community and gathered data that helped us create a framework.

Sawant, Divya Jaiswal, Anchal "AgriBot - An intelligent interactive interface to assist farmers in agricultural chores," by Jyoti Singh Payal Shah. Agriculture is the primary source of income and employment in India. The most common problem faced by Indian farmers today is that they fail to select the right crop based on their region's characteristics and yield history. As a result, they are experiencing a significant drop in productivity.

Agricultural statistics and projections are valuable resources that the government has not fully used despite their importance. The study presents an intelligent portable system that uses data mining and analytics to help farmers with various farming practices and decide on the most suited crops based on current climate conditions, soil conditions, and geographical characteristics of the defined location.

To make this data analysis more accessible to farmers, a chatbot that leverages Natural Language Processing is proposed. It enables farmers to receive audio responses to their input concerns about the agricultural situation, making farmer interaction more user-friendly.

"Smart Sampark-An approach towards designing a responsive system for Kisan Call Center," by Pratijnya Jawan, Pooja Desai, and Veena Desai. The COVID-19 pandemic has hampered the country's economic development. The epidemic is having an impact on the farming industry. Kisan call centers (KCC) or agricultural helplines are set up across India to answer farmers' questions and guide them through times of uncertainty and suffering.

In India, there are 21 KCCs located in various states and union territories. Farmers' questions are answered by KCC operators or agricultural specialists based on their knowledge and data The previous approach has the drawback of requiring the operator or specialists to be available to answer calls

With KCC inquiries, the proposed system accesses the data set made accessible on data.gov.in. The cosine similarity method was used to provide the most similar response to the question, which was generated using the natural language processing (NLP) technology.

"Kisan Nestham - An Android Application for Farmers," by Shaik Naseera and S Abdul Jeevan. Agriculture is the main source of income for around 65-70 percent of the Indian people. Using smartphone technology for farmers has opened up new possibilities. A

mobile application is software designed to run on small wireless devices like smartphones and tablets. Android is an open-source development platform that any programmer with a working grasp of Java and the Android SDK can use.

This software allows farmers to have access to resources that were previously unavailable to them. Smartphone technology is now employed in a variety of applications, including health monitoring, weather forecasting, and so on. It is also employed in the agricultural area. Kisan Nestham is an android-based application that offers farmers information on various crops and agricultural products.

Parameters	Paper 1 Reference	Paper 2 Reference
1. Authors	Gan-Qiong, Shi-Wei, and Zhe-min	Divya Sawant Anchal Jaiswal; Jyoti Singh; Payal Shah
2. Publications	International Conference on Agriculture	International Journal of Farming
3. Usage of Algorithm	Artificial Neural Networks.	Back-propagation neural network, Artificial Neural Networks.
4. Accuracy	89%	87%
5. Advantages	The accuracy is higher when the time interval between data is shorter.	When a larger dataset is compared to a smaller dataset, this will yield more accurate results.
6. Disadvantages	It doesn't work well for larger data sets.	Hardware Requirements

3. SYSTEM REQUIREMENTS

Software Requirements	**Hardware Requirements**
Front End: HTML, CSS, HTML5 Middle Ware: JSP, Servlets, MVC	Pentium IV or higher processor 512 MB of RAM or more Hard disc: at least 20 GB HDD

Back End: MYSQL Connector: JDBC Coding purpose: Eclipse Indigo.	
Browser: Google Chrome/Mozilla Firefox.	
Server: Apache tomcat server 7.	

4. PROPOSED METHOD

This Software can be accessed through any web browser at any place. The interface will be User-friendly so that any farmer / Staff who doesn't know the software can also operate easily. The employee can get all the services like Enrolment, Scheme Filing, Intimation Details, Application Status, etc., Transaction speed will be high compared to the existing system.

Security rate is high by providing highly secured login pages to the different kinds of staff like BHM, DHM, and SHM. The services are immediately updated. The Website Designed has highly secured features and concepts so that hackers or software crashers cannot change the web page's features.

5. MODULES

SHM:-

Staff from the SHM can approve BHM and DHM personnel, as well as create new districts, land data, cost criteria, new schemes, and sanction information. Farmers from various districts who have enlisted can be tracked by SHM. The Yearly Report is also kept track of by SHM.

DHM:-

At the Talu DHM will have a list of accepted farmers. Staff from DHM provide counseling. DHM oversees the last stage of approval. DHM employees distribute subsidies to farmers after they have been approved. They distribute subsidies based on cost guidelines set by SHM personnel.

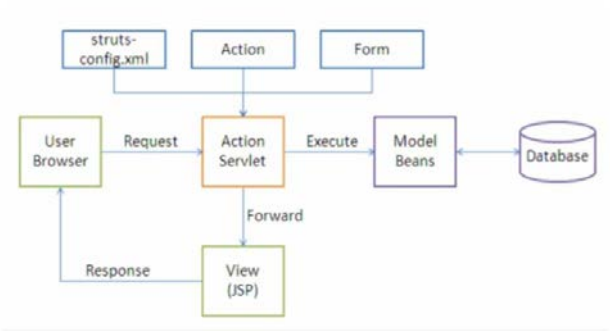
BHM:-

The list of farmers who have enlisted will be available at BHM. The BHM team performs the first stage of verification by the land applied by the farmers. The BHM team also prepares notification details for farmers.

FARMERS:-

Before a farmer may file a scheme, he must first enroll. Following enrollment, the farmer can apply for the crop that he grows. Before attending the counseling, the farmer might check for notification of the counseling. The farmer can check the status of his application.

6. ARCHITECTURE DESIGN



This architecture design incorporates the business logic for storing, retrieving, and manipulating data, as well as interactions with the persistent storage.

The user can see the results in the view. JSP is used to implement the view layer in Struts. After receiving the request, the ActionServlet bundles it into a JavaBean class that extends the Struts ActionForm class and verifies the information entered by the user. The Action class returns an ActionForward to the controller after completing the request processing. The details of the actions, ActionForms, ActionMappings, and ActionForwards, The struts-config.xml file contains everything. The controller will invoke the appropriate view based on the ActionForward.

The view component renders the HTTP response back to the user.

7. SYSTEM DESIGN

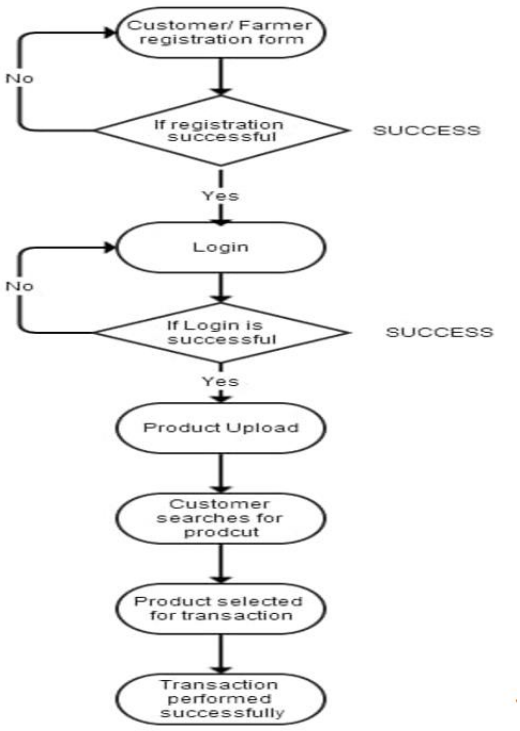


Figure 1 Limitations and Future Enhancement

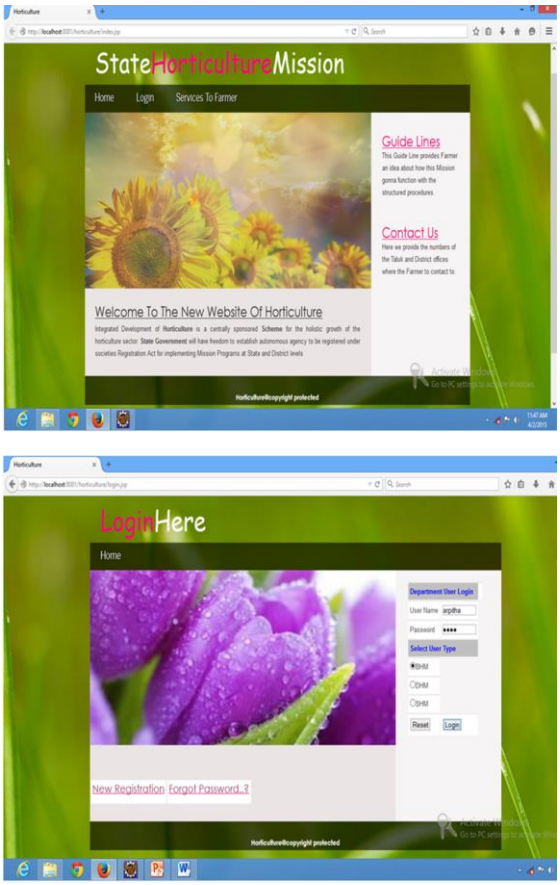
Providing awareness to farmers and encouraging them to use it. Availability of proper Internet for them to use. The Farmers need to be educated to use the Application.

Ethical and social practices, as well as compliance with society's new technology, arises, and the system can be upgraded and adapted to the required environment. Because it is built on object-oriented design, any future modifications are simple to implement. Security can be improved utilizing developing technology based on future security challenges. It is possible to include a built-in web browser. Email addresses can be given domain names. and E-banking is possible.

8. RESULTS AND DISCUSSION

During this project, the "State Horticulture Mission" was successfully designed and quality-tested. We met all of our targets, and our project satisfies the organization's

requirements. The development will be utilized to search, retrieve, and generate data for the requests in question. The machine has increased the use of best practices on farms, resulting in a significant increase in the quality of products and farmland productivity.



9. CONCLUSION

Fruits, vegetables, root and tuber crops, mushrooms, spices, and bamboo are all included in the Integrated Development of Horticulture scheme, which is funded by the government. These programs can be viewed from anywhere using any web browser.

The interface will be user-friendly, allowing any farmer or staff member who is unfamiliar with the software to operate it with ease.

The employee can access all services such as enrollment, scheme filing, intimation details, application status, and so on.

Transaction speed will be faster than the current system. Security will be higher by providing highly secure login pages to various types of staff such as BHM, DHM, and SHM. Services will be updated immediately.

9.1 Future Enhancements

The system can be modified and tailored to the required environment as new technology develops. Any future modifications are straightforward to implement because it is built on an object-oriented design. Based on future security challenges, security can be enhanced by utilizing growing technology. It is feasible to integrate a web browser built-in. Domain names can be assigned to email addresses. E-banking is a viable option.

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Approximate Global Illumination by combining Screen Space Directional Occlusion and Recursive Non-local Mean Denoising

Gururaj U Malipatil
School of Computer Science and Engineering
REVA University & Qualcomm pvt. ltd
Bangalore, India
guru.patil9@gmail.com

Sunilkumar S Manvi
School of Computer Science and Engineering
REVA University
Bangalore, India
ssmanvi@reva.edu.in

***Abstract*—Complex techniques with substantial processing expenses are required to produce photorealistic computer-based photographs. Implementing these methods requires the use of techniques like Ray tracing and Path tracing, which are still expensive in terms of computation even with the most recent hardware-optimized GPUs. As a result, faster and more precise techniques for rendering 3D environments are required to give visual programme users a near-perfect photo-realistic interactive experience.**

For real-time interactive rendering, our proposed hybrid ray-marching/rasterization strategy uses fast non-local mean denoising methods and computes Screen Space Directional Occlusion(SSDO), Screen Space Ambient Occlusion(SSAO) based on the type of surface. Recursive non-local mean Spatio-temporal filter and SSDO with realistic graphics can be achieved by using a rendering model based on raymarching/raytracing, which uses sphere trace or bounding volume hierarchy to calculate intersections with scene objects. For global illumination, we take two indirect bounces of lights in the scene and direct light at rasterized implicit shape surfaces, and we estimate this with one ray traced sample per pixel. We separate the surfaces into matte and glossy to apply SSAO and SSDO and with confidence measurement accumulated over frames by fast approximated non-local mean denoising filter. A rapid approximated recursive non-local filter is used to avoid noise and smooth edge areas in areas where reprojection fails. We demonstrate generating photo-realistic images with fewer artifacts against the offline denoising algorithms

Keywords— global illumination, Denoising, BRDF, SSAO, SSDO, ray tracing, lighting, non-local mean

I. INTRODUCTION

Engines such as Embree and Optix, which are parallel ray casting by efficiently use of CPU and GPU, may conduct path trace global illumination in real-time with considerable noisy results. There is a compromise between ray bounce/sample per pixel and computation cost, ray budgets are anticipated to expand ten-thousand-fold in the future. Offline rendering procedures that require hundreds of samples per pixel represent most of the earlier high-quality denoising approaches for path tracing.

Ray bounce count(cost budgets) required for processing increase with the advancement of CPU and GPU hardware capabilities. Path tracing will eventually increase to a thousand-fold bounce and the convergence threshold will be limited however, we need to do post-processing on a frame and apply denoising filters. Most of the photo-realistic algorithms are based on denoising filter techniques are offline rendering. In this paper, We use Screen Space Ambient Occlusion(SSAO) and Screen Space Directional Occlusion(SSDO) based on the factored Bidirectional reflectance distribution function(BRDF) for the surfaces like glossy and matte. In addition, we add non-local mean temporal filtering across the sequence of the frames to get refined and attractive results. This produces slightly faster and smoother rendering results without blurred surfaces than offline rendering.

The Contribution to the paper is about designing the Spatio-temporal framework and using SSAO and SSDO based on the classified surfaces by ray bounce. The key idea is about approximating the monte-carlo integrator by applying SSAO and SSDO for the matte and glossy surfaces and is also based on the confidence interval of the non-local mean filter over the frames. This produces accountable results in terms of lights reflective and refractive on the surfaces in the scene.

Based on several observations for photo-realistic algorithms, the details covered by reflected light are because of material property and direct light illumination than the light in the scene. We consider SSAO for matte surfaces because we need to consider light bounce in the entire semi-hemisphere and therefore its computationally expensive and exceedingly noisy-but the same dispersion means that the light can be intrusively denoised. In specular surfaces, the specular highlight region is where a lot of light gets clustered. So, we use SSDO where specular lobes direction is considered and can be denoised with filters. In temporal non-local mean, reflection is based on object reflection and not on surface points but the failure is negotiable and can be improved by filters.

Our Method has a different path for the type of lights in the scene (i.e indirect and direct) and material properties. As the frame gets rendered the results are observed to suppress the artifacts and blurring with flicker-free frames.

The following is how the paper is structured. Section II is about related works and the limitation of previous techniques. Section III presents the proposed rendering model algorithm and Section IV presents the system requirement used for Experimental purposes. The results were discussed in Section V . Finally, in Section VI, we provide conclusions.

II. RELATED WORK

Using the instant radiosity method developed by Keller[1], the indirect light component of global illumination can be approximated using a set of Virtual Point Lights (VPLs) in a scene. By shooting photons into the scene and having them intersect with the surface there, this technique formed VPLs, which were then used to light up the scene to render it. For a large number of point lights, there is a computational cost in the calculation of shadows. Lightcuts Walter et al.,[5] is a technique that reduces the number of shadow queries by clustering the VPLs in sets, however, it does not increase performance significantly. This is done by interpolating indirect illumination from an onboard camera's cache Ward et al.,[14]. It's possible to get accurate estimates of the irradiance of some surfaces using ray tracing, and for the rest, interpolation is utilized.

By using spherical harmonics instead of irradiance to store and interpolate indirect illumination, Radiance caching Krivanek et al., [4] adds to the irradiance cache. Specular surfaces can be handled by this method, which requires fewer cache samples. Although some methods for global lighting via denoising have been viewed as an offline rendering problem, the path-tracing method was a prevalent offline process until recently.

The survey by Zwicker et al.[10] Methods based on non-local means (NLM) by Rousselle et al.[15] uses a component of a discontinuously segmented image's zeroth- or first-order gradient. Buffers are utilized to establish the weighting of each sample for each term based on material geometry and other metadata such as light visibility. The motion vector buffer is known as the G-buffer. The G-buffer is used to determine the weights of several machine learning algorithms Kalantari et al.[16] and other edge-avoiding filters e.g., Dammertz et al.[17]). Eisemann and Durand,[18]; Petschnigg et al. and colleagues used Cross bilateral filters in real-time stochastic transparency and computational photography can also be used in offline denoising. Gaussian kernels with each tap weighted by a G-buffer function are used in these. Antialiasing and real-time stochastic transparency Salvi.[19] both make heavy use of projection and temporal filtering. The first time they were used for interactive denoising in Monte Carlo rendering was by Bauszat et al.[21]. Previous Ambient Occlusion(AO) approximation approaches (Lehtinen and Kautz. 2003) required a great deal of pre-computation for Directional Occlusion(DO) and interreflections parameters to save data in a compressed format with restricting spatial or direction design. For example, check related works for matte Durand et al.[18]; Kontkanen et al.[20]; Soler et al.[22] and glossy reconstruction filters aimed to minimize/attenuate bias instead of the visual artifacts that we eliminated by combining SSDO and temporal non-local mean filter kernels.

Real-time denoising was developed by Schied and colleagues.[23] using route-traced images with one path per pixel. Their study was independent and conducted at the same time as ours, so we plan to compare our findings with theirs in the future.

III. PROPOSED WORK

The proposed work comprises five stages (shown in Figure.2): Pre-Pass, PathTrace, Accumulation(Spatio-temporal), Approximation, and Reconstruction. Before proceeding with stages, Our stages are based on the rendering equation and the factorization of the Bidirectional Reflectance Distribution Function(BRDF) function.

To achieve global illumination, we have to know the characteristics of light behavior, characteristics of objects in the scene, interacting with objects in the scene, and finally reaching the eye/camera. The illumination in the scene is dependent on direct and indirect lighting given by the rendering equation:

$$L_o(\omega_o) = \int_\pi L_{direct}(\omega_i)\cos\theta_i f_r(\omega_i, \omega_o) d\omega_i + \int_\pi L_{indirect}(\omega_i)\cos\theta_i f_r(\omega_i, \omega_o) d\omega_i \quad (1)$$

where, ω_o is outgoing light direction, ω_i incoming light direction, $\cos\theta_i$ is dot product of normal and incoming light, $f_r(\omega_i, \omega_o)$ is Bidirectional Reflectance Distribution Function.

Bidirectional reflectance distribution function(BRDF): It is a function that describes the distribution of how much light is reflected from a material or surface when light arrives or falls on it. In general, its ratio of radiance(direction of the camera) by irradiance(direction of light). Refer to Figure 1.

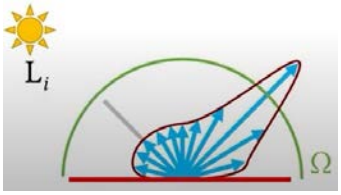

Figure 1: Representation of BRDF.

Our pipline rendering system is processed in stages and in each stage we calculate depth, normals and non-local mean search window data and store in GPU buffers. Figure 2 describes various stages used in our method.

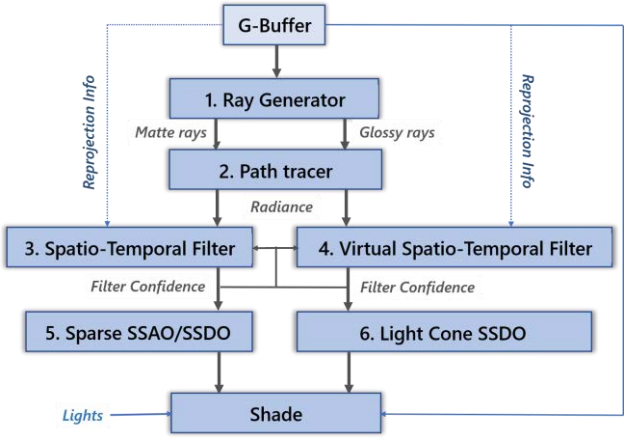

Figure 2: Rendering system (Blue arrow represent G-Buffer and gray arrow represents radiance buffer)

Figure 2. consists of stages and is numbered. In the following sections, we will explain the stages used.

A. *PrePass*

Prepass - Write albedo, normals, and other common G-Buffer attachments to the scene's G-Buffer file. A ray-trace pre-pass (stage 1) is required instead of a raster prepass for the first bounce versions of those buffers.

B. PathTrace

Split denoising with Specular Reflections and Global Illumination in different attachments would be great because reflection denoising performs better on first bounce data, whereas Global Illumination/Ambient Occlusion/Shadows are calculated with spherical harmonic coefficients (stage 2). However, we have found the optimal bounce count by comparing vs rendering.

C. PathTrace

Recursive non-local denoising algorithm:

However, a non-local mean of the frame is more compatible with the approximate RNLM [2] method's purpose of using spatiotemporal information effectively(Fig 2). Pixel estimates from the current frame and the preceding frame are combined to create the RNLM estimates. RNLM additionally uses the difference in convolutions in the search window for consecutive frames to execute on the GPU in parallel. In other words, the current output is generated by fusing the current input frame with the previous output frame. Because temporal recursive (stages 3 and 4) processing reduces overall computing complexity without considerably extending the search window, it helps to gain temporal signal correlations.

The estimate given for the proposed RNLM is:

$$\hat{e}_k(i) = \frac{1}{W_{k,i}}\left[\sum_{j\in\epsilon(i)} w_{\hat{e},k}(i)\hat{e}_{k-1}(p_k(i)) + \sum_{j\in\epsilon(i)} w_{y,k}y_k(j)\right] \quad (2)$$

where $\hat{e}_k(i)$ represents the estimated image at pixel i in frame k. and $\hat{e}_{k-1}s_k(i)$ is an estimate of the previous frame $(i.e, frame\ k-1)$ at pixel $p_k(i) \in \{1,2,â€¦,N\}$. Pixel $p_k(i)$ is selected from $\{\hat{e}_{k-1}(\cdot)\}$ based on the standard block-matching algorithm (BMA) for blocks of input frame k centered around pixel i. The choice of $p_k(i)$ takes into account block and search sizes that may differ from those used for in-frame processing. In particular, the block that corresponds to the block size is $N_bÃ—N_b$, with a search window of $N_sÃ—N_s$. The recursive weight of the expression (2) is $w_{\hat{e},k}(i)$, and the non-recursive weights is $w_{y,k}(i,j)$.

Screen Space directional occlusion:

For specular surfaces, we use SSDO (stage 6). SSDO is to improve screen space ambient occlusion (SSAO) and better approximate global lighting, the direction in which ambient light (both the light that hits the object directly and the light that is reflected by the object immediately behind it) is sampled is taken into consideration. Contributes to the direction of the incident light and,

- Incorporate one or two bounces of ray for calculating indirect illumination
- Complements standard object-based global illumination and
- The extra calculation time is small.

Factored BRDF:

Start by usually splitting the BRDF function into the type of surface like diffuse/matte layers [3]. Glossy/specular term in combination with Fresnel coefficient:

$$f(\hat{\omega}_i,\hat{\omega}_o) = m(\hat{\omega}_i,\hat{\omega}_o)(1-F(\hat{\omega}_i,\hat{\omega}_o))^2 + g(\hat{\omega}_i,\hat{\omega}_o)F(\hat{\omega}_i,\hat{\omega}_o) \quad (3)$$

The shiny term g() may contain a specular impulse. The diffuse term m() needs to change slowly with respect to $\hat{\omega}_i$ and $\hat{\omega}_o$ Like the Lambert model and the Oren-Nayar model.

Split Monte Carlo Integration:

By sampling a Monte Carlo integrator for standard materials(for light or more) using indirect light L_i we calculate outward radiance L_o at point X on the surface with key visibility. The Eq is given below:

$$L_o(X,\hat{\omega}_o) = \frac{1}{2N}\sum_{i}^{2N} L_i(X,\hat{\omega}_i)\frac{f(\hat{\omega}_i,\hat{\omega}_o)|\hat{n}\cdot\hat{\omega}_i|}{\rho(\hat{\omega}_i)} \quad (4)$$

Here, each $\hat{\omega}_i$ in the incident direction of 2N is independent. sampled from distributions $\rho\hat{\omega}$ and L_i is calculated by path tracing.

Non-zero distribution can be selected for ρ, where f is non-zero. The integrator makes the sample optimally important regarding the material, $\rho(\hat{\omega}) \propto f(\hat{\omega},\hat{\omega}_o)|\hat{n}\cdot\hat{\omega}|$. Different sampling distributions can be chossen for the various BRDF terms and its optional. In case of diffuse estimator (stage 5), we choose

$$\rho_m(\hat{\omega}) = \frac{max(\hat{\omega}\cdot\hat{n},0)}{\pi} \quad (5)$$

to cancel the numerator. For optimal important sampling when $m()$ is almost constant throughtout the hemisphere. To estimate specular term (stage 6), Select the incident direction $\hat{\omega}_j$ for the specular term from some distribution ρ_g, which is close to $g()$ but can be sampled efficiently like a power-cosine. (We differentiate between the use of index j for specular and index i for diffuse that these directions are sampled independently.) The complete estimator is:

$$L_o(X,\hat{\omega}_o) = \frac{\pi}{N}\sum_{i}^{N} L_i(X,\hat{\omega}_i)(1-F(\hat{\omega}_i,\hat{\omega}_o))^2 m(\hat{\omega}_i,\hat{\omega}_o)$$
$$+\frac{1}{N}\sum_{j}^{N} L_i(X,\hat{\omega}_j)\frac{F(\hat{\omega}_j,\hat{\omega}_o)g(\hat{\omega}_j,\hat{\omega}_o)|\hat{n}\cdot\hat{\omega}_j|}{\rho_g(\hat{\omega}_j)} \quad (6)$$

D. Approximation

Both the F and m parameters used in Eq 6. have a slow change in incidence and outgoing vector that can factor them from the integrator to separate material and light for approximation. Therefore, we need to select a single representative incident vector $\hat{\omega}_i$ outside the operator summation by selecting $\hat{\omega}_i = \hat{\omega}_s$,the specular mirror reflection of $\hat{\omega}_o$

As a result, the diffuse/matte part of the estimator (Eqn. 6) is reduced as follows

$$\frac{(1-F(\hat{\omega}_s,\hat{\omega}_o))^2 m(\hat{\omega}_s,\hat{\omega}_o)\pi}{N}\sum_{i}^{N} L_i(X,\hat{\omega}_i) \quad (7)$$

A similar approximation is made for specular estimators. However, because we know that g can be very sensitive to the incident direction $\hat{\omega}_j$ (that is, potentially have narrow lobes), g cannot be out of the summation and should be

evaluated for each sample. The glossy part of the estimator (Eqn. 6) is as follows.

$$\frac{F(\hat{\omega}_s, \hat{\omega}_o)}{N} \sum_{j}^{N} L_i(X, \hat{\omega}_j) \frac{g(\hat{\omega}_j, \hat{\omega}_o)|\hat{n} \cdot \hat{\omega}_j|}{\rho_g(\hat{\omega}_j)} \quad (8)$$

E. Reconstruction

The chain of filters, SSAO/SSDO-Filter using the G-buffer by camera-space plane distance in both normals and depth from the center sample with corresponding weights. Every G-buffer frame contains illumination obtained from neighboring samples that are spatially and temporally (recursively and nonlocally) nearby, allowing the convolution of the search window, X-position variation, and the implicit time parameter to be calculated (stages 3 and 4). The temporal (stage 4) using non-local mean filter does reverse re-projection from data of the previous frame. It computes the confidence interval of how well the reprojection positions match. The high-frequency noise is removed significantly by stages 3 and 4. Because of the aforementioned three factors, over-blurring of the image is not apparent when using this method

- Previous section approximation excludes material features (matt reflectance m and specular magnitude and albedo F0) from the total of the material properties.
- According to the roughness of the material, the diameter of the specular spatial core is determined.
- Compensate for motion with reverse reprojection.
- Caustic reflections are blurred and are hard to reconstruct from sparse samples.

(stage 5) does 3 x 3 SSAO filter for matte surfaces, which eliminates the low-frequency noise. SSAO is usually faster as it's operating in image space. (stage 6) does SSDO filter where the light direction is considered for glossy surfaces. The filters SSAO and SSDO (stages 3 and 4) are optimized for matte surfaces but because of reprojection, the temporal filter will lead to some blur for glossy surfaces when in motion.

IV. System Requirement

In Table I, we give a detailed account of the specification of the software and hardware of the machine we used for all test cases documented in this work, as well as for the render images presented. Finally, we want to note that all the results for rendering time and graphics fidelity presented in the following sections are rendered in 1280x720p resolution unless specified otherwise

Software	Qt Qml and OpenGL 3.3
Operating System	Windows 10.1 Version 1809 (build 17763.1098)
CPU	Intel i3-6600k
GPU	MSI Radeon R9 390 8GB GDDR5
GPU driver version	Radeon Software Adrenalin 2020 Edition 20.1.4

TABLE I System Specification

V. RESULTS

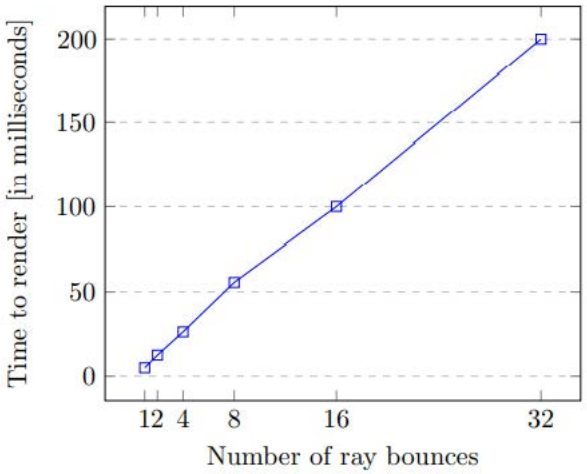

Figure 3: Data visualization of how changing the number of ray bounces affects the total rendering time of our model for the renders

The number of bounces that we take into account each time we march a new ray is critical to the image fidelity we want to provide. This parameter introduces a compromise between image fidelity and the time to render the final image: the higher the number of bounces, the more realistic the image will look but will be more expensive to compute. In order to understand the differences each ray bounce count imposes in the time to render the final image, we decided to plot the different data we measured from the multiple renders. The visualization of how each bounce count affects the time to render is displayed in Figure.3.

From Figure.3., we observe that in order to provide each frame in less than 41.6 milliseconds, we must pick a number of ray bounces that is smaller than 7. From this case study, we conclude that our range of optimal ray bounces is between the 4 and 6 range for a simple scene. Since we don't observe major differences between the 4 and 8 bounce count renders, we decided to set our default number of bounces to 4 for the rest of the case studies of our model.

A visualization of this temporal method is presented in Figure 4, where we can observe the progressive denoising applied over time to render fractal geometry. Our denoising method proved successful in delivering the same fidelity of graphics provided by renders of over 32 samples but only using 1 sample per pixel/ray without any visible noise after accumulating frames for a second. Applying the denoising process seen in Figure 4, we can provide the user with a time to render 76.9ms between frames. While this is only 13fps and is surely beneath our limit for real-time graphics rendering, rendering the same scene using a multi-sample approach would require 10 samples for it to converge to the last render seen in Figure 4 (10 frames accumulation). The suggested 10 sample render would require 10x the rendering time of the denoised render, thus providing each frame at 770ms, rendering the application unusable from a user interaction standpoint.

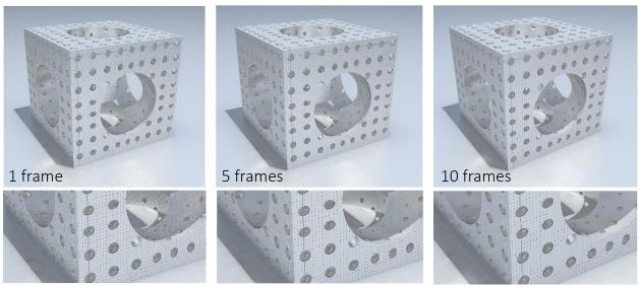

Figure 4: A comparison between noise accumulation in a different count of total frames elapsed

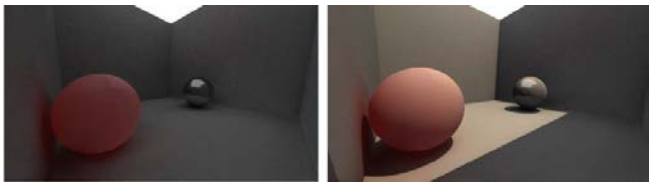

Figure 5: Global illumination and emmisive objects effects with denoised

Our denoising study case is a render of a simple scene composed of two spheres inside a room with no roof. Let's use it to analyze and compare the effects of global illumination produced by our rendering model against Blender's Cycles path tracer. The output produced by our method is shown in Figure 5 and the rendering time in ms of each stage(Figure 2) in our rendering pipeline in Table II

Stages	Time
Spatio-Temporal Filter (Matte&Glossy)	~45
SSAO (Matte Surface)	~5
SSDO (Glossy Surface)	~15

TABLE II: Per Frame rendering time in milliseconds at 1280 X 720 for filter GPU pipeline stages.

We observe that the render produced by our proposed model has some noise in a few cases. Nevertheless, we believe that for this scene our model provides a higher dynamic range of light when compared to Cycles's render: shadows are darker and the ambient occlusion factor is higher. Although this makes the version rendered by our proposed model look more realistic, we can't say that this is a clear win since these variables are easily configured in both models to match the wanted visuals without using extra computational power.

VI. CONCLUSION

Despite our conclusion that the model we proposed in this work is capable of delivering high-fidelity graphics in real-time, we are aware that it has a few limitations like blurring at low or high-frequency noise, in SSAO noise occurs for depth discontinuity at object edges, the closer glossy surfaces are blurr compare to distant ones.

Consequently, we wish to specify a couple of improvements in FPS by reducing the frame buffer pixel format and datatype precision. To make results stable and spatially smoother, we may improve denoise filter algorithms or replace them with faster denoising filters.

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SOFTWARE ENGINEERING IN ARTIFICIAL INTELLIGENCE

[1]S. Selvakumari, [2]S. Dinesh, [3]P. Ganeshbabu, [4]V. Vaneeswari

**Department of computer Science, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.*

Email: selvakumaris5589@gmail.com **(S.Selvakumari)** *Corresponding author:* S.Selvakumari

Abstract **-** Mining of computer programming information had proved beneficial for reusability of portions in programming enhancement. Man-made reasoning operates on a large application area of computer programming activities. Shrewd information disclosure couples Artificial Knowledge with Data Mining for shrewd processing of computer programming tasks. The synchronization of fraudulent knowledge with information mining for aiding programming developing applications drives Software Intelligence. This study analyzes three man-made reasoning strategies that employments information mining, business knowledge, AI for expanding computerized programming reuse for programming development what's more, generally programming improvement. The business knowledge instruments are used for shrewd information disclosure of code that will be utilized for reusability of utilizations and components. An investigation of a few AI techniques in programming reuse region of computer programming is explored for computerized programming reuse what's more, differentiating evidence of possible examination possibilities in the field.

Keywords **-** Software Reuse, Artificial Intelligence (AI)

I. INTRODUCTION

The Software Development Lifecycle (SDLC) stages are spanned by a variety of activities in programming projects. A variety of information mining techniques have been used to weed out non-valuable data from the massive amounts of data collected throughout the SDLC. This research analyses several man-made reasoning methods with applications in computerization of reusable programming plans. Information mining, artificial neural networks, and so on have been used in the product design area to solve certain computer programming challenges. All the procedures listed above need to be automated due to the increasing risks associated with programming's increasing complexity. As the product grows in size, the level of complexity rises, which has an impact on both the timeline and the cost of software development. Every step of the SDLC contributes a significant amount of information age. From requirements investigation and detail, through framework and programming plan, execution and unit testing, reconciliation as well as framework testing,

activity and maintenance stages [4], the information alters. The complete programming engineering and configuration designs may be reused at the framework and programming configuration level. Finding meaningful information in these massive datasets is shown by the mining of large datasets. In any event, the incorporation of artificial intelligence (AI) into the overall development of programming with reusability and the support of robotization for hierarchical norms is concurrently beneficial. Aims to introduce distinct features of Simulated Intelligence in the programming reuse field for enhancing programming understanding are presented in this study. In the last section, the most essential AI approaches for product reuse and the complete product design process are discussed [7]-[13]. Artificial Intelligence in SE Application Levels (Simulated intelligence SEAL) scientific classification has been established by Feldt et al., which classifies applications according to their location of use, the kind of AI innovation used, and the robotization level authorised. Artificial Intelligence (AI) may be used to help solve a wide range of computer programming-related problems by studying it from top to bottom, according to this study. Programming improvement efforts like Data Technology the board, programming application advancement, and programming security have all been considered creative applications of counterfeit knowledge approaches [3]. An investigation of AI processes in programming development, as well as hazard the board stage for AI-based frameworks and hereditary codes, has been conducted by Raza Et al. [6]. As a result, the application of artificial intelligence (AI) is crucial in the reuse and planning of computer programming.

II. DATA MINING IN SOFTWARE

It has shown to be a profitable field for extracting useful data from various programming stores in order to resolve probable programming design challenges. Information mining may be used for a variety of purposes in the programming design field, including the development of artificial intelligence. In any event, automating programming insight tasks by combining business insight with programming enhancement remains a viable research area. To aid in product development, a variety of business knowledge tools are now available. Harman et al. have emphasised the role of AI in computer programming by focusing on search-based programming and work on probabilistic reasoning [7]. As a part of this section, we'll discuss how artificial intelligence (AI) is being used in programming, as well as how it's being used in conjunction with three of the most prominent programming exploration fields: information mining (information extraction), artificial intelligence (AI), and man-made brainpower (ML).

Programming archives have revealed a wealth of information that may be used to investigate a wide range of programming challenges. Identifying and analysing programming design information, as well as the associated programming metrics such as cyclomatic complexity, cyclomatic density, and the number of lines, nodes, and edges, as well as the number of comments and comments per line, as well as the total number of lines, as well as the total number of executable lines, as well as the number of lines with no comments or comments, is referred to as "landfilling." It is possible to combine human-made reasoning with programming in information-based frameworks in order to reuse potential pieces. There are many similarities between Business Intelligence and Programming Insight, which focus on the coordination of man-made brainpower in companies and programming.

Insights into the Business

Researchers in fields like computer programming for specialists, information-based frameworks, computational knowledge, and robotic computer programming are discovering the importance of the future pattern of human reasoning with programming design arrangements that display real-world objects like business measures, master information, or interaction models[8]. Mechanization of programming improvement measures is made possible by the coordination of business information in product design activities.

III. SOFTWARE CONSTRUCTION

Software development encompasses the full Software Development Lifecycle (SDLC) with massive amounts of data being processed at each step. With so much data being generated at all stages of the SDLC, the information preparation process is taking longer due to the increasing complexity of programming. The information disclosure measure becomes useful for reusability of possible components when important data is mined throughout the SDLC. Usage improvement assignments may be made easy and time-saving via the use of programming reuse. The components that might be reused in the development of apps are carefully selected and should only be used with high-quality parts that are bug-free and can adapt to the current technology and advances. The reusable pieces must be produced using an issue-driven strategy and critical thinking approach to diverse programming tasks in order to achieve effective and competent reusability. This procedure of programming reusability should be automated and the reusable components selected based on the programming task's problem space, so that the course of programming development becomes computerised. Furthermore, it will assist maintain product quality, making the programming more efficient and efficiently adaptable to changes in technology, and so reduce the cost and time required for the overall programming improvement process.

Developing Software

Additionally, information mining and computer programming are included in the process of developing mechanised programming. The extraction of useful information for identification and determination of a possible candidate for reuse will be supported by the combination of man-made consciousness techniques and the mining of programming information. Programming Insight (BI) and Business Intelligence (SI) are synonymous in the programming industry, and this will lead to the automation of all programming design activities, including reuse. The whole of it An investigation of the programming space may be done to reuse typical BI stages for the acceptance of BI frameworks in large associations. There are several ways in which man-made awareness approaches may be used to enhance programming growth in an orderly fashion. With reuse-driven programming, the design, measurement and association of programming reuse is critical to achieving commercial success. Programming design, information mining, and man-made reasoning are all vital to the evolution of programming knowledge, and the combination of these three domains will ultimately lead to the automation of programming development. Using AI and mining projects, programming insight is used to sustain the complete SDLC in a unique condition, as well as the particular yield of programming reusability for future programming advancements at the hierarchical level. The next section discusses the many AI processes that play a crucial role in the domain of programming reusability for orderly advancement of programming.

Analysis of Artificial Intelligence Techniques

A variety of product improvement projects have been examined using man-made reasoning methodologies such information-based frameworks, neural organisations, fluffy rationale, machine learning, and information mining [9]. Programming engineering plan, programming coding and testing, and robotization of programming measures have been explored by Amaar and colleagues [10]. This section focuses on three common human reasoning approaches that are used in the programming reuse area of computer programming, and examines each of them. In a systematic vast area, just the clear ways are provided. Many different artificial intelligence (AI) methods exist to aid in the process of enhancing a software. Information mining, artificial intelligence, and neural networks are all examined in this study to highlight their unique importance in the vast area of computer programming, which is dominated by programming reuse. Programming reuse is an amazing region for the expansion of programming expertise in associations, and the most important techniques are referenced in the table.

IV. CONCLUSION

This study examines several approaches of faking computer programming skills in the programming reuse space. As a result, Software Intelligence (SI) is being developed as a means to improve computerised programming reuse, as well as to improve overall programming advancement, by combining false knowledge with information mining. It is hoped that an analysis of a few AI methodologies discussed would lead to planned distinguishing demonstration of possible research possibilities in the area of computerised reasoning and programming reuse.

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Data base Security Using Various Programming Languages

[1]K. Saraswathi, [2]V. Vaneeswari, [3]S. Geetharani, [4]V. Lakshmi

Department of computer Science, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Email: saraswathik5511@yahoo.com (**K.Saraswathi***) Corresponding author:* K.Saraswathi

ABSTRACT

The issue of data security is one that is becoming more prominent. One way to gauge its importance is to look at the rise in the number of situations where sensitive data has been lost or exposed due to unauthorised sources. To demonstrate how an application's security may be planned and implemented for a given job, this article focuses on database management systems. In part, this is due to the fact that databases are more recent inventions than programming languages and operating systems. Many businesses and government agencies rely on databases to store and manage their data, which is why they are so important.

Because they are a popular target for hackers, databases and the information contained inside them are highly prized business assets that must be safeguarded at all costs. Database systems have similar security needs as other computer systems. Database management software and sensitive data are protected from unauthorised access or harmful assaults by security measures. Some of the most prevalent data security strategies that may be used to safeguard and improve databases are discussed in this article.

Keywords: Attack, unauthorized, Database security, Threat, Integrity.

1. INTRODUCTION

All businesses rely on computerised information systems for their everyday operations. A database is used to facilitate this process. Databases are collections of connected data, where data is information that has an inherent meaning. Students' names, roll numbers, and other personal information may be stored in the database, for example. In order to gather, process, and make available to a certain user population, logically interconnected data reflecting some parts of the actual world must be stored in this system. System for managing data contained in databases includes a number of applications that allow for the definition, maintenance and retrieval of data stored there (DBMS). There are three levels of abstraction in relational database management systems: outward, conceptual, and internal. In addition to providing access and modification of data, a database management system (DBMS) must also offer

security [1]-[8].

Many secure systems are built around data security, and database management systems are used by many users to keep their data safe. Reengineered databases are crucial to many businesses and government agencies, housing data that is more effective and better aligned with new and updated aims. It is essential for every firm to improve its database security to ensure seamless operations. The different dangers put the organization's data integrity and accessibility at jeopardy. Outside unlawful programme actions or external forces, such as a fire or a power outage, might result in threats. Most of the database includes sensitive user information that may be hacked and misused. Because of this, companies have more control over their databases and monitor their systems more carefully to prevent purposeful breaches by intruders [9]-[13].

2. TYPES OF DATA SECURITY

In order to protect sensitive information, encryption keys utilise an algorithm to turn regular text characters into an unreadable format. Final line of security for sensitive volumes, file and database encryption solutions encrypt or tokenize their contents. Security key management is a feature included in the majority of systems.

Uses software to fully wipe any storage device, making it much more secure than normal wiping methods. Verifies that there is no way to retrieve it.

Companies may enable teams to use actual data to create apps or teach employees by disguising data. If required, it hides personally identifiable information (PII) to allow development to proceed in legally compliant conditions.

It is important that the data centre be able to withstand and recover from any form of failure, whether it hardware-related or caused by events such as power outages or other disruptions.

3. DATABASESECURITYREQUIREMENTS

1. Database systems have the same fundamental security needs as other computer systems. Access control, data exclusion, user authentication, and dependability are the main issues.
2. In the event of a catastrophic event, a database's data may be reconstructed from scratch, ensuring that the database's integrity remains intact.
3. Logical data integrity: The data model remains intact. With a solid sense of reasoning.
4. In a database, a change to one field's value does not alter the values of other fields.
5. You can trace who or what has accessed database components by using auditability.
6. Users are only permitted to access data that they are authorised to see. Various users

might be prohibited to accessing the system in different ways.

7. Every user must be authenticated, both for the audit trail and for the authority to access particular data, in order for the system to function properly.
8. Accessibility: Users have full access to the database and all of the information to which they have been granted permission.

4. DATABASESECURITYGUIDELINES

When it comes to a database, users need to be able to put their faith in the data's accuracy. To meet this requirement, the database administrator must ensure that only authorised personnel are updating the database. The database management system has the option of requiring a high level of user authentication. Some databases need special password and time-of-day checks, for example. The operating system's built-in authentication isn't complete without this extra layer of protection.

In many cases, databases are partitioned based on user access credentials. Even though all users may see all data, only some departments can access salary and sales data, such as those in human resources. The centralization of data storage and management provided by databases makes them very practical. It is important to maintain database integrity in order to guard the database from external threats, such as a failed hard drive or an index corruption in the master database. Recovery methods and integrity controls in the operating system [2] solve these issues. An unintentional recipient of encrypted sensitive data will be unable to decipher it. Because each degree of sensitivity has a unique key, sensitive data may be kept in an encrypted table.

5. DATABASE SECURITY LEVELS

There are a number of steps we must take to ensure the database's safety:

An intruder may get access if a user has been given permission to do so without their knowledge, which is why permissions must be granted with caution.

Even if the database system is safe, a flaw in the operating system's security might allow an unauthorised user to get access to the database.

Software-level security in the network software is as critical as physical security, both on the Internet and in networks private to an organisation, since most database systems offer remote access via terminals or networks.

Some database system users may only be allowed to view a small piece of the database. While other users may query the data, they may not be able to make any changes.

1) 6IN DIFFERENT FORM OF ATTACK

2) Following a breach of every layer of protection, an attacker may launch the following sorts of attacks:

3) Direct assaults are those that directly target the target data. There are no protective systems in place that prevent these assaults from succeeding.

4) Direct assaults: As the name indicates, direct attacks are carried out on the target directly. However, different transitory objects might be used to acquire data from or about the target. Some of the combinations of distinct inquiries are utilised for the aim of evading the security mechanism. Tracking these sorts of assaults may be a challenge.

5) Only data existent in the database is accessed in this attack, and no changes are made. The following are examples of passive attacks:

6) A snapshot of the database at a certain point in time may reveal the database's plaintext values in a static leaking attack.

7) In this case, information about plain text values may be obtained by connecting the database values to the index positions of those values.

8) Database changes over time may be tracked and analysed to get information about plain text values, allowing for dynamic leakage of data.

9)

10) In an active attack, the database values are altered to reflect the assault. In contrast to passive assaults, they might lead a person astray. For example, if a user gets the incorrect answer to a query, they may end up with the wrong information. This kind of assault may be done in a number of ways, including the following:

11)

12) The cypher text value is substituted with a created value in a spoofing attack.

13) Splicing is the process of substituting a different cypher text value for an existing one.

14) Cipher text values are changed with an older version that has been modified or erased, which is called a replay attack**.**

7COMPUTER SECURITY MECHANISMS

People, procedures, and technology all play a role in a complete data security plan. Adequate controls and policies are as much a function of an organization's culture as they are of the tools that are used to implement them. There must be an emphasis on security across the organisation.

7.1 Server and user device physical security: While it doesn't really matter where your data is stored—whether on-premises or in an off-site data center—you must have proper fire suppression and temperature control methods to keep your data safe. These safeguards will be taken care of by a cloud service provider on your behalf.

7.2 Access control and management: Using the "least privilege access" philosophy across your IT infrastructure is a good idea. Allowing only those who really require access to the database, network, and administrative accounts to get their duties done.

7.3 Patching and security of applications: If a patch or new version is published, all software should be updated as quickly as feasible.

Restore Points: A strong data security policy requires that all vital data be backed up in an useable and fully tested manner. The same physical and logical security measures should be applied to backups as they are to the main databases and core systems.

Employee training: 7.5 Workers who are educated on the need of password hygiene and security procedures become "human firewalls" who can help protect your data.

Monitoring and management of network and endpoint security

Risks may be mitigated by using a comprehensive set of threat management, detection, and response tools and platforms that span both on-premises and cloud environments.

8.DATABASE SECURITY

Although database security is a broad topic, we will focus on a few of the more essential ones in this article. Access control, application access, vulnerability, interference, and auditing mechanisms are all crucial database features.

Access Control: Policies for controlling access to database objects are created using access control policies. In terms of access control, Discretionary Access Control is the most popular. Rules of authorisation govern policies of discretionary access control. In order to perform a specific action on a specific object, a subject must be granted authorisation to do so.

Inference Policy: This is critical for a specified degree of data protection. It occurs when a greater degree of security is necessary to prohibit the examination of specific data in the form of facts. Protecting sensitive data is made easier with the use of an inference policy.

Users must be identified and authenticated before they may access any data. This is the most fundamental duty to assure security. Authenticating the user's identity is an important security measure since it prevents sensitive data from being altered by an unauthorised party.

In order to maintain the physical integrity of the data, specified access to the databases is required, and this is done via auditing, as well as for the purpose of preserving records.

Auditing and accountability may be used to examine the data a user enters on servers for the purposes of authentication, accounting, and gaining access.

A cypher or code is used to encrypt data so that only those with access to the cypher text's secret key can decipher what is encoded. Encrypted data refers to the ciphertext or encoded text.

9. SECURITY MEASURES

Regardless of the size of a company, any data leaks or security breaches are a genuine threat. Despite the security breach, the stakes go well beyond financial gain. Wrong information security puts all of your consumers at risk, and thus also the future of your company. Records security structures that have been tampered with provide several risks, hazards, and consequences. Regardless of the size of a company, safety breaches have a significant impact. Risks associated with poor data security far exceed the costs of putting in place a high-quality system. Businesses of all sizes must implement a variety of security measures as a preventative step.

Data backup: The practise of backing up data on a daily basis is essential for all serious organisations. Conventional records backup is the repeating, reorganisation, and storage of virtual data in a traditional manner. The use of a physical data storage device or a cloud server or a dedicated server is not required for data backup. Businesses need data backup because it allows them to access information from a previous period. Another important benefit of data backup is the ability to restore lost information. In the event of a security attack, statistics might easily go off course. All digital information will be lost or distorted in some way. The first step to securing your information is to back up your data.

Data healing is a method of retrieving data that has been corrupted or damaged and is no longer accessible because of this. The physical storage device as well as the file device are harmed. Restoring lost data may be made much easier by making regular data backups. For the vast majority of companies, data restoration is required because of damaged walls and file systems, or because records have been erased. Businesses must have a data recovery plan in place as part of their overall data protection strategy.

Security: Virus The term "epidemic" or "malware application" refers to a dangerous software or document that spreads like a virus or worm. Malware or viruses that aren't visible must be driven to infect and corrupt critical data with ease. Viruses and malware may also alter data, get access to private information, disseminate garbage, and reveal confidential information. Viruses may be very harmful to a company's operations. Despite the fact that they have no influence on data, they have the potential to destroy the reputation of a marketing firm.

Firewalls are mechanisms for ensuring the security of a network. Firewalls keep tabs on the flow of information in the community and enforce security policies. Associate leader's community is isolated from the rest of the internet by a firewall, which acts as a form of barrier. Firewalls restrict access to all potentially harmful communications. Malware and networked computer worms will not be able to infect and spread due to the presence of firewalls. It is normal practise for computer hardware to operate network firewalls. The location of the system's guests is managed by host-based whole firewalls, which are entirely software-based.

CONCLUSIONS

The safety of company data is of paramount importance. Multiple security dangers must be guarded against in order for a business to remain safe. Information security has become so critical to business operations that experts have sought to develop innovative and effective methods for keeping sensitive data out of the wrong hands. Database security has a number of important aspects that must be taken into consideration. The best security for a safe database is represented by that database's best possible defence. Starting at the physical level and working up to the data level, securing database security must be done from the outside in. (physical, network, host, applications and data).

Because of the amount of data they hold and the ease with which attackers may access it, databases are a popular target for cybercriminals. The ultimate objective is to have a data warehouse. Security efforts for databases are far more extensive than those for other forms of data. An access list for a large number of files is simpler to build than an access list for database components. Security methods for databases should not annoy their users. A company's most valuable asset is its data. At whatever point of an organization's lifecycle, protecting critical data is a daunting challenge. There are a variety of techniques to accommodate a database. There are a variety of current assaults and dangers from which a database has to be guarded.

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Automatic Text Summarization of Extractive and Abstractive: A Survey

Abdulrahman Mohsen Zeyad, Arun Biradar

School of Computer Science and Engineering,
REVA University, Bengaluru.

Abstract.

Manual summary up is one of the old, time-consuming topics. It needs to have a good understanding of the content of the text and practice this task beforehand, with the rapid development of data and the profusion of its resources a data (such as social networking sites, News, Health, Economics, scientific articles, meetings, and books, etc.). It became clear the need to summarize these data and access information in a short time, considering the accuracy of the summary. To achieve the most significant benefit of ATS, the summary remains average in performance while striving to achieve this using modern methods, improving performance, and reaching a summary closer to the human summary. Among the modern methods used, the system of Extractive and Abstract will be discussed in this survey with the perception of ATS.

Keywords— Automatic Text Summarization, Extractive, Abstractive, ROUGE.

1. INTRODUCTION

The field of natural language processing (NLP) is one of the most important fields, given what it provides in several areas that are used daily in many aspects of life, for example, translation from one language to another, summarizing texts while preserving the meaning, reading texts from images and videos, extracting them and converting them to text, Converting speech to text, analyzing texts and giving an impression of the content, automatic text correction, and completion of missing words, generating text or writing a specific script based on the sentence or word and many more. With the rapid development of data and the multiplicity of its resources, whether in paper publications (such as magazines, newspapers, and books) or on the Internet (such as user reviews, blogs, communication networks, scientific papers, scientific websites, books, health and news in all its forms, other important documents) it is considered a source of The sources of vast data in the form of text are increasing rapidly daily. Hence, it consumes much time from users to find information that gives a summary of the search process amid a large amount of repetitive and unimportant data that does not carry any additional information for users, as well as wasting time, effort, and money, they cannot even read and understand all the textual content of the search results, so it is necessary to go to summarize the texts and present them to the user more acceptable to access the information. Manual summarization is one of the best ways to do that, and at the same time, it is expensive and consumes much time in terms of summarization and effort and productivity. Therefore, it has become difficult for humans to manually summarize vast amounts of text data. Therefore,

Automatic Text Summarization (ATS) is one of the tasks of NLP, and it can be the leading solution to this problem for several reasons:

- Given the significant information from a long text in a short time to reduce reading time
- Quick access to the most crucial information at the same time.
- Solve the problem of the correlation of the meaning of the summary with the evaluation of the summary previously.
- The summary is closely related to the original text Algorithm may be less biased than human summaries. Summarize texts in minutes using the software.
- Removes extra text while showing basic information and facts.
- Unlimited use of the summary with a reduction of the summary text.

However, the automatic summary is a task that is not easy because there are many issues, such as the repetition of words, the temporal dimension in the use of words, the standard reference to form the association of words with each other, the importance of arranging sentences with each other, the lexical ambiguity of the word many meanings Semantic ambiguity the sentence has multiple meanings, the syntactic ambiguity of the sentence has several parse trees. And so on, which needs particular attention when summarizing, which makes this task more complex and needs more research and study about Automatic Text Summarization of Extractive and Abstractive (ATS-ES).

2. ATS-ES SURVEY

They have applied BERT word embedding both to extraction, and abstraction with a new approach, using the Attention mechanism, Pointer mechanism, Copy mechanism, and WordPiece tokenizer, using deep learning, to use measurement the ROUGE they got on to (extractive ROUGE-1 42.54 and abstractive ROUGE-1 41.95), using the most popular databases such as “CNN/Daily Mail and DUC2002”[1].

They have applied transformer and seq2seq both to extraction, and abstraction with a new approach, using the Filtering TRANS-ext + filter +abs and Self-attention mechanism, using deep learning, to use measurement the ROUGE they got on to (extractive ROUGE-1 41.52 and abstractive ROUGE-1 41.89), using the most popular databases such as “CNN/Daily Mail and Newsroom”[2].

They have applied BERT-based BERTSUMEXTABS both to extraction, and abstraction with a new approach and New fine-tuning, using the Self-attention mechanism, and deep learning, to use measurement the ROUGE they got on to(extractive ROUGE-1 43.85 and abstractive ROUGE-1 42.13), using the most popular databases such as "CNN/DailyMail, XSum, NYT"[3].

They have applied Factorized Multimodal Transformer both to extraction, and abstraction with a new approach and New fine-tuning, using AVIATE, OCR, and Self-attention mechanism, and deep learning, using databases such as "How2 dataset and AVIATE dataset ", for text summaries of videos[4].

They Improved summary quality performance using a dual-attention pointer network (DAPT), and the LSTM decoder method uses a ‘‘teacher forcing’’ algorithm to use measurement the ROUGE they got on to(ROUGE-1 40.72)), using the most popular databases such as "CNN/DailyMail"[5].

3. ATS-ES APPROACHES

In general, ATS is a complex process that can take time and quality of summaries because computers do not understand natural human language; depending on the type of input documents, the type of databases and topics, the type and quality of the summary may vary.

ATS has two main methods: abstract and extractive. The abstract approach is more productive than the extractive approach to achieving summaries and is closer to a correct understanding of human language.

The advantages of good abstract production are repetition, keyword similarity, sentence position, sentence length, etc.

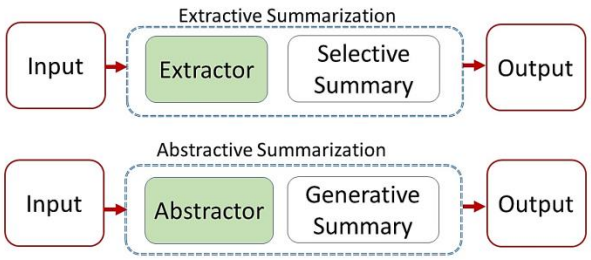

Fig.1 The architecture of an Extractive text summarization system and an Abstractive text summarization system

A. Extractive

It summarizes the extractive text: the method of identifying the essential words and sentences in the entered text to form a summary. This summary selects the most relevant group of words that have meaning. Extractive summarization seeks to arrange the sentences and words in order of importance to them with the exact contents of the words of the text, meaning that it uses the words in the original text. They are linked to form the final summary, with the style used being more robust to the use of existing phrases, but it lacks flexibility not to use new words that express better and not to reformulate the summary to simplify the summary problem.

B. Abstractive

It summarizes the abstractive text: It is an evolution of the traditional methods of text summarization, where the main sections and ideas in the text are identified by reformulating the text by creating new sentences and phrases, meaning representation and re-generation of a summary with sentences different from the original text and original sentences, to give the text greater flexibility and be coherent The meaning of the concept is closer to the human summarization, which depends on reformulating the summary and reducing the size of the summary text while preserving the general meaning. The abstract

summary is considered one of the most complex methods that attempt to solve problems related to the quality of the text and overcome the inconsistency of the text and link them, and supports identifying the most appropriate expressions Sentences based on the content that has been summarized.

4. ATS-ES PROCESSING TECHNIQUES

ATS is one of the most critical challenges of NLP and artificial intelligence in general and access to the use of deep learning methods. Hence, it is necessary to identify the most valuable parts of the text at different stages to be included in the final summary and document long, such as books that were created by the computer without reference to human summaries, so there are three phases of automated summaries:

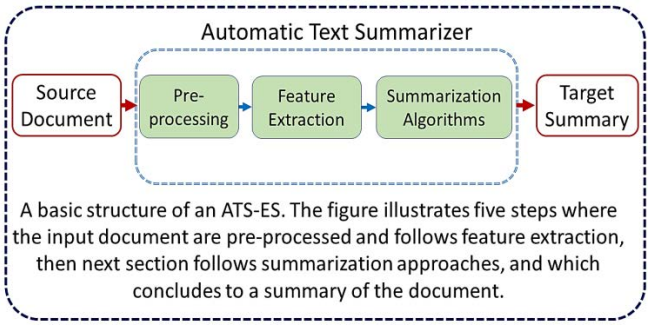

Fig.2 A basic structure of an ATS-ES.

A. Pre-Processing

Pre-processing: Techniques such as techniques of linguistics are used to pre-process the input documents, and linguistic techniques such as sentence segmentation and word encoding Remove stop words, part-of-speech marks, etc. The most commonly used procedures in pretreatment will also be mentioned:

1) Parts of Speech (POS): It is a technique for grouping the words of texts and organizing them according to the context of the speech, such as nouns, adverbs, adjectives, verbs, etc., and determining the type of this word in the grammar and linking it to the rest of the sentences.

2) Stop word filtering: It also determines the shape of the word, whether the word is letters or numbers, and whether it is one of the Stop words or not, and it is used to block words from appearing in the text, such as A, an and by.

3) Stemming: Returning words to an initial form for a group of words and returning them to their roots after removing the inflexions for them, meaning to return the word to its origin, all the words plays, playing, played, player refer to the word play.

4) Named Entity Recognition (NER): The words are recognized in the entered text as noun elements, which are related to the identification and classification of important words, such as the names of people, institutions, names of countries or cities, time, money, percentages, as well as identifying the names of the media from the names

People, companies, cities, currencies, and so on.

5) Tokenization: It is the process of dividing the sentence into a number of parts (words), and it is called one token, or it means separating each word separately to deal with it and know its type, etc. It is based on separating words from sentences so that Each word is alone, and there are two types of it: the word tokenizer, which means separating words, and the sentence tokenizer, which means separating sentences, each sentence separately and examining the words in the text.[9]

6) Lemmatization: It is similar to stemming in the idea, but it is more powerful and effective. It is not satisfied with removing the extra letters in words, but by searching for their meaning and basis, so the words, been, were, whose root is, be, and so on, as it takes into account the meaning in the sentence, the word meeting Its origin maybe meet if it is a present verb, and its origin may be the same as meeting in case it is a noun and not a verb (meaning to meet).

7) Matchers: word association: a tool that allows words to be linked together to make NLP realize that we mean that they have the same meaning, and it is imperative when we search for a specific word that is written in more than one way (Bangalore, Bengaluru) or words with different letters, but we want to We unite them in a specific word (artificial intelligence, artificial intelligence, machine learning, machine learning, deep learning)[6].

B. Feature of Extraction

Feature of extraction processing: It is a method for look the topic, first sentences, or features in the underlying data or from the source text, and the feature extraction method. Associated with them are the number of appearances of words and sentences or text and their importance. In this section, the most frequently used features are mentioned to represent the text and to generate the summary:

1) Term frequency (TF): It is the product of dividing the number of times the required word is repeated by the total number of words in one file to determine the importance and impact and to represent the weight of the word.

2) Term Frequency-Inverse Document Frequency TF-IDF: Two important values, first, Term Frequency, which means the frequency of the required word, and secondly, Inverse Document Frequency, which indicates how rare or common this word is. We have now mentioned the first value, TF; what about the second? The second value indicates how common the word is, and it is inversely proportional to the strength of the word. Note that word itself, if it is widespread and common among all texts, and its use increases in all

other documents, makes it have a weak effect on itself, meaning that any word spreads in many texts and Documents with different meanings. This word often has less value and influence in the meaning and in determining the type of text.

3) Position Feature: Considering that the first and last sentences will give more information about the text, giving an advantage in the summary.

4) Length feature: The length of the sentence may indicate whether it is to be added to the summary. This may cause an error assuming that the lengthy sentence is worth mentioning, compared to the length of the other sentences in the text, so neither relatively short nor long sentences are included in the summary.

5) Sentence-Sentence Similarity: It is partly about measuring the percentage of similarity between two words, whether in letters or the meaning in the text, and it may help summarize.

6) Title feature (Tif): Sentences containing terms from the title included in the summary may be presented because they contain part of the title.

7) Phrasal Information (PI): Attributable phrases are always valuable for summarizing. A group of P phrases also), verbal phrases (VP), nominative phrases (NP), and includes adjective clauses (ADJP)[6].

C. ATS-ES Algorithms

Based on the algorithm used to generate abstracts, ATS is based on two types shown below:

To summarize texts, two machine learning methods are applied - supervised and unsupervised machine learning:

a) Supervised Learning Methods:

Supervised summary, naming documents, the first step is how to learn by training on documents to identify the summarized and non-summarized ones with their labels, which requires a set of data that comes labelled for use in the learning process and also needs to train a sample Data by naming of human-assisted input text. Supervised learning, the learning method, comes at the sentence level to learn sentence discrimination and the characteristics of sentences embedded within the abstract. It also has significant drawbacks in making manual context summaries while requiring more training from previously classified samples for classification; English Wikipedia articles can be dealt with to summarize or group sentences using open-source data.

b) Unsupervised Learning Methods:

Unsupervised summary There is no need to categorize or label the text. Summarization is performed without assistance, i.e., identification of introductory sentences of the text by the user using advanced algorithms and the use of latent semantics to be used as user input and automation. These methods are helpful for big data to give summaries of Sentences that are logical and meaningful.

5. PERFORMANCE OF ATS-ES

Evaluating an abstract is a difficult task because there is no perfect summary of a document or text. Although a good summary is a summary that gives meaning to the original text without neglecting the details and coherently and coherently the, meaning without bias during the summarization that may result from the human summarization and with the various human scales of the summaries and also for the lack of a standard evaluation to determine the main content and important phrases and locate relevant information, Therefore, an automatic assessment is required that determines the effective and reliable assessment of the summary measure. The assessment scale is presented in the field of ATS-ES as follows:

Recall Oriented Understudy for Gisting Evaluation (ROUGE) is a sequence of assessments and matches the automatically generated summary to a set of pre-summarized summaries, ideally like human-generated summaries. Four different scales are ROUGE's: ROUGE-S, ROUGE-N, ROUGE-W and ROUGE-L; three were used; thus, it is a widely used summative assessment sponsored by the National Institute of Standards and Technology (NIST)[7].

ROUGE -1 (Unigram), ROUGE -2 (bi-gram), and ROUGE -L (the longest common suffix) are the most commonly used single-docs.Presence statistic based on N-gram. It can range from being Unigram to Bigram to Trigram, depending on the n-Gram length. Post-common Longest Common Sequence (LCS)-based statistics take into account the similarity of sentence-level structure naturally and determine the longest common occurrence in the sequence n-grams automatically[8]

6. RESULT AND ANALYSIS

Model	ROUGE-1
Extractive Model	
BEAR (ext +large) [1]	42.54
TRANS-ext + filter [2]	42.8
BERTSUMEXT [3]	43.85
Abstractive Model	
BEAR (large + WordPiece) [1]	41.95
TRANS-ext + filter +abs [2]	41.89
BERTSUMEXTABS [3]	42.13

Table 1 Performance comparison of models with Extractive and Abstractive on CNN/Daily Mail

Table 1 shows the performance of models on CNN / Daily Mail datasets. The data in the tables show that the Extractive Model outperformed the Abstractive Model in terms of 1-ROUGE values, which indicates that Extractive exceeds Abstractive based on the results despite the variety of models applied to both of them.

It is clear from this that abstraction provides an understanding and meaning of the text, in contrast to extraction, which links basic sentences or paragraphs without understanding their meaning.

7. CONCLUSION

The ATS is one of the most important applications of NLP today, and with the attempt by researchers to find ways to help improve the quality of summarization by developing summarizing methods and raising the quality of assessment with more effective tools to measure the performance of the summary text and obtain a perfect summarization. The text is better than the abstract summarization of the text, which is less efficient, and the difficulty in its application is the abstract summarization. The field is still open to solving various such complications in the field of ATS.

In the future, hybrid summarization will be added to its study, and there were some experiments to suggest hybrid textual summarization systems with abstract and extractive.

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Green Globe: A step towards green and clean world

Author: Pranay Dey Pranjal singh Praveen Kumar Pratyush Rai

School of Computer Science and Engineering

REVA University, Yelahanka, Bengaluru, Karnataka, India

Guide: Kiran Kumar A
Assistant Prof.

***Abstract*—** In this paper, we would be working with technologies like image processing using OPENCV, image enhancement, image classification, auto notification sending using Python. Here, we will be working on a cleaner and well developed environment. We will distinguish Garbage, litters from the surrounding environment and broken social asset like road and send all the info to the respective govt departments like PWD/municipal corporation. Garbage disposal is one of the biggest problem so the person disposing off garbages on the streets are doing a crime. We propose another structure for recognizing the illigeal dumping of trash in surveillance cameras. And although a few activity/conduct recognition techniques have been explored, these investigations are not really applicable to genuine situations since they are mostly centered around very much refined datasets. Since the trash dump activities in reality take a variety of structures, making another technique to unveil the activities as opposed to taking advantage of past methodologies is a very good procedure. We distinguished the trash dumping activity by the adjustment of connection between an individual and the thing being held by hime/her. To find the individual holding thing of unique structure, we utilized a "background subtraction algorithm" and "human joint detection." The individual held object was then followed and a "relation model" between the joints and items is fabricated. At long last, the dumping activity was recognized through the module. Also, the proposed structure is carried out in a constant observing framework through a quick web-based online algorithm. we will also see how to alert an user on detection of a person in the camera view or a broken. We will use a deep learning model for person and broken road detection and remaining work of cropping the detected person and sending it in a mail will be taken care of by OpenCV and Python.

I. Introduction

- Green globe would help us in the road maintenance
- Basically the photos which CCTV captures of roads will be processed through computer vision and check if road is broken. If found directly sent to the PWD officer through mail.
- As we will use Machine learning algorithms in the cctv camera which is placed on roads.
  - Trough which it will automatically capture the road photos for the time to time maintenance
  - We will also add a feature which would distinguise garbages from the environment and would help us catch people who throw garbage anywhere except inside the dustbin. Photos will sent to the respective department.
  - If garbage is thrown in the roads, that photos also been captured by the cctv camera and sent to PWD officer so the road will be cleaned time to time.

II. Literature Survey

1. ***Road Damage Dataset 2019, Maeda, H., Kashiyama, T., Sekimoto, Y., Seto, T. and Omata, H. (2020)***

Combining a progressive growing GAN along with Poisson blending artificially generates road damage images that can be used as new training data to improve the accuracy of road damage detection.

2. ***Road Damage Detection and Classification Using Deep Neural Networks with Smartphone Images: Road damage detection and classification, June 2018, Hiroya Maeda, Yoshihide Sekimoto***

SSD using Inception V2 (GPU) 63.1
SSD using MobileNet (GPU) 30.6
SSD using MobileNet (smartphone

3. ***Litter-detection-tensorflow, Spring 2018, Dr. Shaun-inn Wuu***Team chose to use the API "TensorFlow" to develope the algorithm, "Jupyter Notebook" to give interface to the algo, and an "Amazon Web Services" in "Ubuntu server" to train the algo. Using TensorFlow's already trained model and its associated "COCO" dataset, it was able to have a base for the object detection part of the project's developmental activites.

III. METHODOLOGY

1. **To detect damaged Roads,** we are utilizing "Road Damaged Dataset" containing trained models and leveled pictures. Pictures are introduced as a similar type to "PASCAL VOC":- trained Models are SSD Inception v2 and SSD Mobile Net

- Road Damage Dataset (dataset structure is the same format as PASCAL VOC) of Adachi like :- JPEGImages - contains images, ImageSets - contains text files that show training or evaluation image list and Annotations - contains xml files of annotation

Required library

We recomend Installing with virtualenv.

- tensorflow 1.4

The Definition of Road Damage

Table 1: Road damage types in our dataset and their definitions.

Damage Type			Detail	Class Name
Crack	Linear Crack	Longitudinal	Wheel mark part	D00
			Construction joint part	D01
		Lateral	Equal interval	D10
			Construction joint part	D11
	Alligator Crack		Partial pavement, overall pavement	D20
Other Corruption			Rutting, bump, pothole, separation	D40
			Cross walk blur	D43
			White line blur	D44

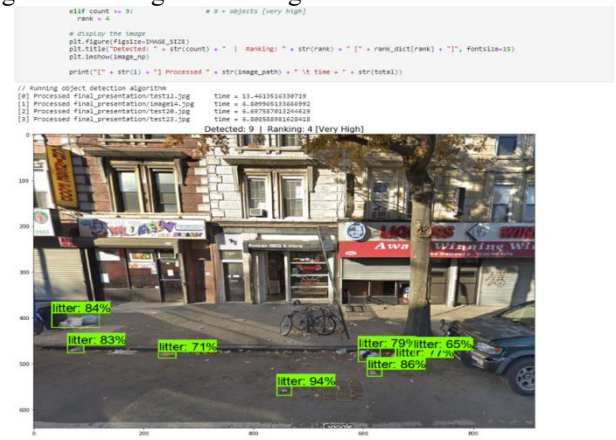
Source: Road Maintenance and Repair Guidebook 2013 JRA (2013) in Japan.

Note: In reality, rutting, bump, pothole, and separation are different types of road damage, but it was difficult to distinguish these four types using images. Therefore, they were classified as one class, viz., D40.

2. **To detect Garbages around the corners, roadside** we utilized the API "TensorFlow" to develope the algorithm, "Jupyter Notebook" to give interface to the algo, and an "Amazon Web Services" in "Ubuntu server" to train the algo.

The objective was to carry out the trash recognition part of the algo and to execute the recognition, nonetheless, the group will initially have to train the marked dataset as per its requirements. The group previously divide the "dataset" into 2 sets; 81 % of pictures are utilized for training and left are utilized for testing. Like Fix-it, we train the algo to specific measure of "steps", creating a needed "checkpoint" file which is then use to test the accuracy of algo's trash recognition. This "checkpoint" file showed to the group when to pause the training and then test algo to confirm its learning progress. We utilized RCNN model to recognize litter from pictures pulled off of google streets.

When the training is done, team tried the algo with different kinds of pictures. Those pictures that didn't have trash in that "dataset" are likewise utilized here. The group expected to ensure algo wouldn't confine different items pictures regardless of whether there was no litter in the image. Last result has the algor only box parts of trash with more than a half certainty (50%), alongside a ranking for the image.



3. **Object Detection Notifier**

Detect objects, capture it and send them to mail with the image attachment : Here we will be using Vignesh karthik Kumar's git repo, as it already prep by him. We ll need to use "SSD Mobilenet v2" trained with "COCO" dataset using API of Tensorflow.

Requirement:

Imutils == 0.5.4

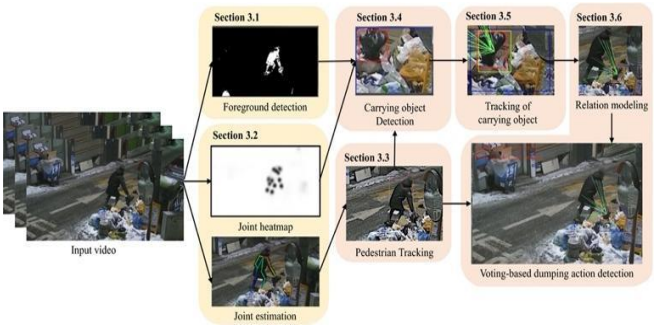
opencv-python == 4.5.3.56

Numpy == 1.21.2
pkg_resources == 0.0.0
pip==21.2.4
Scipy == 1.7.1
Setuptools == 57.4.0
Wheel == 0.37.0

In Process:

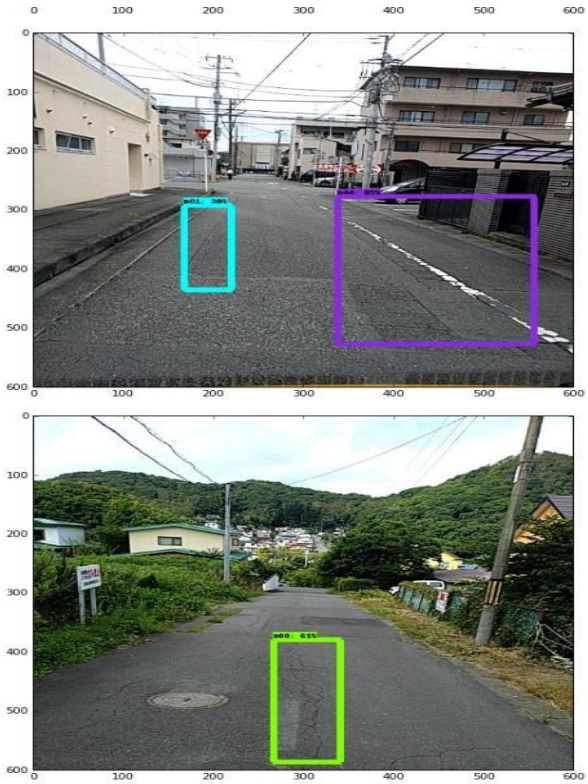
4. **Vision-based Trash dumping activity and movement detection:**

In this paper, they propose another structure for recognizing the illigal throwing of trash in genuine surveillance cameras. However a few activity/conduct recognition techniques have been explored, these investigations are not really **applicable** to genuine situations since they are mostly centered around very much refined datasets. Since the trash dump activities in reality take a variety of structures, making another technique to unveil the activities as opposed to taking advantage of past methodologies is a good procedure. We distinguished the throwing activitues by the adjustment of connection betn an individual and the thing being held by him/her. Finding individual holding matter/thing of unique structure, we utilized a "background-subtraction-algo" and "human-joint-detection." Individually held thing was followed and the "Relation-model" between the "joint" and items were fabricated. At long last, the dumping activity was recognized through the module. Also, the proposed structure is carried out in a constant observing framework through a quick web-based online algorithm.



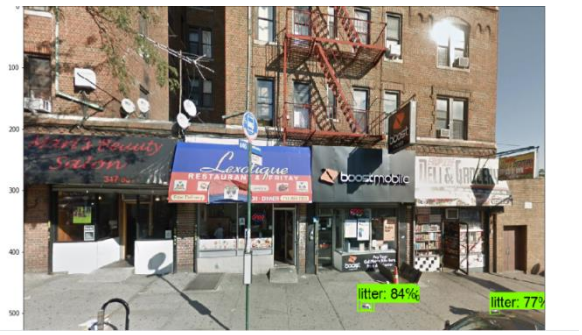
IV. EXPERIMENTAL RESULT

1. Damaged Road Output



After Trainig when real life photos are provided, they boxed the broken parts of the road with the damage ranking (i.e scale of damage). Refer to "**The Definition of Road Damage"** to know how we classified different scales of road damages.

2. Litter detection Output



Here the Algorithm successfully identifies the litters thrown in the road with 50% certainty.

V. CONCLUSION

Safe and Clean Roads and environment would ensure a healthy environment for our future generation, more strong India can compete with the world to become the most respected , powerful and well maintained country. Stricting the clean India rules with advance technology ensuring its strictness will help the society. So in conclusion I will like to thank Our University, Our Project Guide Mr. Kiran Kumar A for giving us the platform to fulfill our dharma of "Raj-Seva" and let us help our country.

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Object detection using MobileNet SSD in OpenCV python and comparison with YOLO

S Anusha[1], M Bindu[2], G Navya[3] , Venkata Sai[4] ,A.Ajil [5]
[1,2,3,4]Student, Dept. of CSE Engineering, REVA University, Bangalore, Karnataka,India.[5]
Professor, Dept. of CSE Engineering, REVA University, Bangalore, Karnataka, India

Abstract

These days we can see that object detection has a huge number of applications in different sectors. Some of the applications are healthcare monitoring, video surveillance, autonomous driving, robot vision, anomaly detection. One of the application of object detection which is face mask detection was of prominent use during the covid situation. As days are passing the application of object detection is also increasing. So improving the accuracy of object detection by improving the algorithms used, methods used would be beneficial. There are different algorithms available for object detection like SSD, YOLO, R-CNN, Fast R-CNN, Faster R-CNN. We have chosen to implement object detection using SSD and YOLO. First we have implemented object detection using SSD algorithm. Then we implemented using YOLO algorithm. Later we have compared the accuracy of both the algorithms.

Index Terms-- ssd, yolo, tensor flow, openCV, matplotlib, mobie net, deep neural networks, coco

1.INTRODUCTION

Object detection has two parts object localization and object classification. Object localization locates object in an image. Object classification classifies located object in appropriate category. There are many object detection algorithms available like SSD(Single Shot Detector), YOLO(You Only Live Once), R-CNN, Fast R-CNN, Faster R-CNN. We are carring out the object detection using SSD and then YOLO and doing the comparision. [6][7]SSD which stands for single shot detector is the object detection algorithm which carries out both the steps i.e localization and classification in single shot.

[2]Hence detects fast. There are many classification algorithms available ResNet, DarkNet-53, VGG-16, MobileNet. We are using MobileNet as our classification algorithm. MobileNet is based on CNN(Convolutional Neural Network). The job of MobileNet layers is to convert the pixels from the input image into features, these features describe the contents of the image, and pass these to the other layers. OpenCV is the (Open Source Computer Vision library) is an open source computer vision and machine learning software library. Python is the programming language we are using in the jupyter notebook to implement the project.

Face unlock in our smartphone and self driving cars are applications of object detection. Technically object detection is a technology that includes computer vision and image processing used to detect objects in images and videos. To make it more clear we can take the example of self driving cars. Self driving cars make use of the moving object detection technology where computer vision and image processing are used to determine the distance between the car and the moving objects to create alert and accordingly guide the self driving cars. Artificial intelligence is the basic principle that actually drives object detection. Definitely we can see a lot of applications of artificial intelligence and object detection in the upcoming days and hence we can see many more job opportunities related to this field. Many pre trained models are already available so we don't have to train each and every category of the object and that model can be used with the help of few lines of codes. It's all possible because of deep learning algorithms or availability of the computational resources.

1.1 Literature Survey

[1]In the paper object detection for autonomous driving using YOLO(You Only Look Once) written by the authors Abhishek Sarda, Dr.Shubhra Dixit, Dr.Anupama Bhan and published on 31st march 2021 the algorithm used is You Only Look Once. The advantages are it has fast detection time, YOLO predicts accurate results and provide minimal background errors and the disadvantages are they are considering only value of weights for

1000 epochs to avoid overfitting. Only 5% increase is seen in the mAP value from 1000 epochs to avoid overfitting. Some false positives and false negatives are still identified.
[2]In the paper object detection system based on SSD(Single shot detector algorithm) written by the authors Qianlun Shuai, Xingwen Wu and published on 24th November 2020 the algorithm used is SSD(single shot detector). The advantages are SSD model accurately detects objects at different scales. It predicts the different feature mapping. SSD can obtain feature maps at different scales and the disadvantage is the model needs to be improved with the introduction of Convolution block attention model.

[3]In the paper pothole and object detection for an autonomous vehicle using YOLO written by the authors Kavitha R, Nivetha S and published on 26 may 2021 the method used was as follows. Initialize the package/library in openCV . Then load the network model from labelled dataset . Then initialize the parameter containing weight, model, threshold. Later camera captures the object. Then read the frame from the captured scene. After that predict the object from the frame . Then extract the feature of the object and compare it with YOLO dataset. Later object detection happens. Then if object matches with the dataset then boundary box with class name and confidence value is displayed as output else if object dosen't match then go back to predict object from frame step and continue further steps until it matches. COCO and VOC dataset were used. The advantages are Region based CNN (RCNN) is too slow. When compared to RCNN, Fast RCNN and Faster RCNN are better in terms of speed. When compared to these YOLO and SSD are having highest speed and simpler architecture and the disadvantages are Even though Fast RCNN and Faster RCNN are slow when compared to YOLO and SSD, Fast RCNN and Faster RCNN are better in terms of accuracy. In this paper to carry out object detection they have specifically used YOLOv3, its speed is lesser than YOLOv5.
[4]In the paper a pedestrian detection method based on YOLOv3 model and image enhanced by Retinex written by the authors Hongquan Qu, Tongyang Yuan, Zhiyong Sheng, Yuan Zhang and published on 4 february 2019 the method used was carring out

localization first then classification but one extra thing done here was they compared two models with and without image enhancement. YOLOv3 object detection algorithm is used. darknet-53 in the CNN algorithm used. For enhancing the image quality retinex is used. Instead of retinex they could have used other image enhancement techniques like histogram eqilization. But what histogram equilization does is it expands gray scale, different gray scale will be trying to scale down to one. Hence details are lost. Using high pass filter, low pass filter to improve image quality is also not a good idea as it only smoothen or sharpen image. So retinex is used to improve image quality. Retinex is made out of two words retina and cortex. It's mechanism is similar to human eye method which focuses on brightness and reflection. So the two models were tested and compared. Model without image quality enhancement had 90% detection rate and 5% false alarm rate and model with image quality enhancement had 94% detection rate and 2% false alarm rate. The advantages are since retinex theory is used to enhance the image quality, accuracy is increased. YOLOv3 is used, its detection speed and accuracy is more than SSD and the disadvantage is YOLOv3 is having lesser accuracy than YOLOv5, if YOLOv5 would be used it would have given much more accuracy.

[5] The paper Multiple Real-time object identification using Single shot Multi-Box detection was written by authors Kanimozhi S , Gayathri G and Mala T and got published in the year 2019. The method used in this paper was Singleshot Multi-Box detection. The main advantages of using this method are High speed and accuracy of SSD using relatively low resolution images. The disadvantages are The multi-output layers at different resolutions have impacted the performance hugely, in fact, even removal of few layers resulted in a decrease in the accuracy by 12%.

[6]In the paper object detection based on SSD-ResNet, SSD is employed as basic network structure and the inside VGG16 is replaced with The ResNet101 network. This paper was written by the authors Xin lu,Xin kang,Shun Nishide and Fuji Ren and got published in the year 2019.The advantages of implementing this method are, authors in

this paper used SSD model which is more suitable for solving multi-classification problems.Compared to original SSD model the accuracy is increased by 17%.The disadvantage is SSD-ResNet is better than original model in accuracy but the amount of calculation is increased.

[7] In the paper face detection bassed on single shot detection and camshift written by the authors xizhi hu and bingyu huang was published in the year 2020. The method used was single shot detection and camshift . The advantages are combining of ssd network and improved camshift algorithm improves the detection efficiency which has a strong robustnesss to the effect of light loss and the disadvantage is it includes huge storage requirements.

[8] In the paper face detection based on Object detection and tracking using YOLO written by the authors N Muralikrishna, Ramidi Yashwanth Reddy, Gaikwad Sudham was published in the year 2021. The method used was object detection using YOLO. YOLO has multiple advantages compared to RCNN which is the conventional technique used for object tracking. and the disadvantages are comparitevely low recall and more localization error compared to faster RCNN.

1.2 Methodology of SSD algorithm

Object detection has two parts object localization and object classification. Object localization locates an object in an image. Object classification classifies located object in appropriate category. SSD is the object detection algorithm which carries out both localization and classification in one step that means single shot.

1.3 SSD Algorithm Architecture:

As shown in fig 1 the steps are as follows:

Step 1:[11]First an image is passed with two objects in it. A condition must be satisfied before sending an image as input in object detection that is the object must have ground

truth box around it. Ground truth box will further help us locate the object. Step 2:The image is passed through the classification algorithm i.e MobileNet, there feature map is extracted. The feature is compared with the feature in dataset. There it is defined as a particular object has these salient features then its a dog, else if a specific object has certain other set of salient features then it is a cat. So accordingly the features are compared with the dataset and it classifies that object to a class with maximum similarity of salient features with the dataset.

Step 3:[10] Next we encounter 6 convolutional layers which help us to locate the object .

What these 6 convolutional layers does is it gives 8732 predictions for each object. That means each object has 8732 bounding boxes as prediction around it.

Step 4: The image reaches object detection. By the time the image reaches the object detection the objects have 8732 predictions each, which is a large number, so the non max supression removes all the duplicate predictions.

Step 5: So the next step is sending the image to non max suppression. Yet there is a large number of prediction so those predictions are filtered out with more than 50% overlap of bounding box(prediction) over ground truth box. The top 200 predictions are taken based on confidence score. [5]Here the bounding boxes with less confidence score are eliminated. SSD makes use of IOU(Intersection Over Union) to find a bounding box(prediction with maximum overlap with ground truth box.

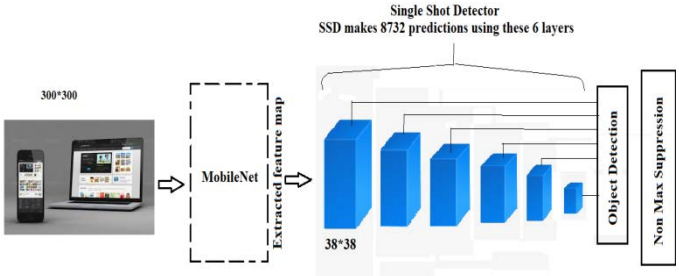

Fig 1 : SSD Architecture

1.4 Methodology of YOLO algorithm

Any idea implemented on test set gives good results then the idea is good. Using rigorous evaluation proved that this idea is better. Speaking about bounding boxes, sometimes square boxes locate the object, but sometimes a smaller or bigger square bounding boxes might be required, sometimes rectangle shaped bounding boxes might be required to locate the object and sometimes elongated rectangle might be required not horizontal. This way problem keeps increasing. We need to check for all these shape and size bounding boxes, it takes time. So the solution is object detection as a regression problem. What exactly happens here is a specific shaped and sized bounding box is placed at one edge of image and runs the classifier. It checks if object is there that is it takes the features and compare with the dataset if the features dosen't match with the feature set of any object in dataset then the box moves to next position and same thing repeats until object is found. This is sliding window based algorithm .Now the solution according to YOLO algorithm is that they made a more generalised training set is formed. Here there are 4 parameters for bounding box they are bx,by,bw,bh, then object is there or not, and three classification parameters c1,c2,c3. Here the bounding box is a real number i.e bounding box parameters dosen't tell whether it belongs to class 1 or class 2 or class 3 so only classification is not enough . So YOLO is declared as a regression problem. Regression is a supervised machine learning algorithm which predicts a specific output based on the set of features the only difference between classification and regression is that in classification the output is a label and in regression the output is a real number. Example of regression is based on size of the house the cost of the house is predicted. As size of the house increases cost of the house also increases. Here the size of the house is independent variable and the cost of the house will be dependent variable. As size of the house increases cost also increases i.e continuous and cost which is output is a real number. That is in regression the output will be real values or continuous nature. Another example is during winter sales of sweater increases.In YOLO along with classification localization must also be done so the

bounding box parameters are needed. The bounding box parameters give real number as output so YOLO is said to be regression problem and not only classification problem.

1.5 YOLO algorithm

YOLO algorithm is a single neural network (only one layer of input nodes). Here the process is simplified i.e input is passed through a deep learning architectire and object will be detected. [1][8]YOLO is faster than R-CNNs and Fast R-CNNs. Only YOLO will do all detection work in self driving cars i.e no need to use many algorithms. In self driving cars an object is detected but by the time its recognized what exactly it is, it might have travelled with 60km/hr speed and come closer to object. This delay happens with R-CNN, Fast R-CNN . Hence in self driving cars we can't use R-CNN, Fast R-CNN.This problem is solved in YOLO the delay is reduced i.e while training we train the model using real objects but still it recognizes what object it is. YOLO generalizes in a better way i.e even for paintings it detects object.[3] Accuracy of YOLO is slightly lesser than R-CNN, Fast R-CNN.YOLO divides the image into N grids. [4]YOLO detects in single neural network only.

As shown in the fig 2 the steps are as follows:

Step 1: Image will be classified based on similarities of their salient features. The salient features will be compared with the dataset and accordingly will be classified.

Step 2: [9]It passes the image through several convolutional layers and detects the object.

Step 3: The image is divided into several grids and then it will be located. In the fig 2 we can notice that there are many grid cells of equal dimension.

Step 4: Every grid cell will detect objects that appear within them.

Step 5: Bounding box regression helps in locating.

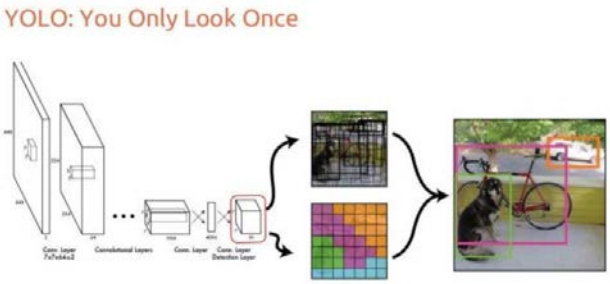

Fig 2 : YOLO Architecture

2.1 Implementation of SSD

In this project we tried to detect objects using mobile net ssd pre trained deep learning models and opencv using python as programming language. Using these pre trained models we classified labels with the help of training data.Based on salient features we will classify the image to which category a image belongs to. Deep learning algorithm that we will be using for image classification is MobileNet. MobileNet ssd algorithm gives good speed as well as accuracy.Using ssd we can detect multiple objects in single shot.So localization and classification is done at the same time unlike other methods which require two or more shots to detect. First we need to import cv2 that is opencv,this library is used to perform image processing. Then we need to import matplotlib.It is used for plotting. There are many deep learning architectures and already pre trained models in tensor flow.We use open cv to load the models.The most recent model is mobilenet ssd version 3.Then we need to have configuration file where we set default values like input size etc. So we load the configuration file. Now we have a create a model that is cv2.dnn_DetectionModel.Then we pass frozen model and configuration file as parameters to this model.This is the main model which detects the objects.Then we create a text file which has names of all labels of coco data set.Coco data set consists of total 80 classes.So we get 80 labels for 80 classes and we copy all these labels in a text file.We need these

labels to check whether we got correct output or not. Then using python list we store these labels.

If we print the class labels we can see the list of labels of all 80 classes and if we check the length it shows 80. Once we load the model the next important thing is to setup configuration. Then as shown in fig 3 we read an image using command cv2.imread and display the image on screen using plt.show. By default tensor flow displays image in BGR format. We need to convert the image to RGB format using cv2.color convert. After loading the model we have to setup the configuration. We gave default input size 320×320 , median Grey scale level and set input swabRb as true. Now the model gives class index ,bbox and confidence as output. we need to set font size and font type for labels. Then we need to have a loop for class index , confidence in a zip. As shown in fig 4 the model will successfully detect the objects in the image with labels and bounding boxes . Similarly we also deployed the code for video and Webcam and efficiently detected the objects .

Fig 3 : Reading the Image

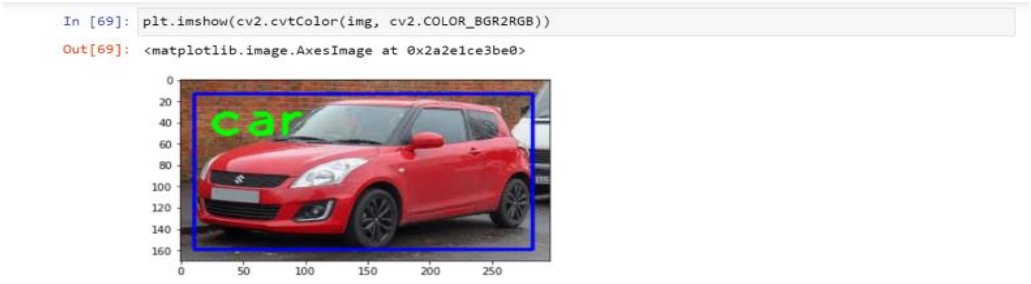

Fig 4 : Detection and labelling the image using SSD

2.2 Implementation of YOLO

First we have to import opencv and numpy libraries and define the input and mention the detection confidence threshold and non-max suppression threshold.Then read the classes from the coco dataset file . For training the model we have used convolutional weights that are pre-trained on Imagenet. Now initialize the weights and configuration files.using OpenCV darknet module read the model configuration file and model weight file. we need to generate the label files that Darknet supports. Darknet requires a .txt file for each image with a line for each ground truth object. The features learned by the convolutional layers are passed onto a classifier which makes the detection prediction.The prediction is based on a convolutional layer that uses 1×1 convolutions.The size of the prediction map is exactly the size of the feature map before it. Then we create a function to find the objects and assign the bounding box thresholds and using the OpenCV rectangle function we draw the bounding boxes and using putText function we add the labels to the output.Then for testing the setup, we will write a small code inside the while loop. Prediction features include the classification loss, loss function, objectness score .We run the loop and the model will detect the objects in the image and draw bounding box around it. Each bounding box has an x, y, w, h coordinates and box confidence score value. The confidence score is the value of how probable a class is contained by that box, as well as how accurate that bounding box is.Confidence score helps us to check weather the output

we got is correct or not. The class confidence score for each final boundary box used as a positive prediction is equal to the box confidence score multiplied by the conditional class probability. The conditional class probability here is the probability that the detected object is part of some class. So yolo v3 prediction has 3 values of height , width and depth. YOLO by default only detects and displays objects with a confidence of .25 or higher. In the fig 5 we can notice that the horse is been detected correctly.

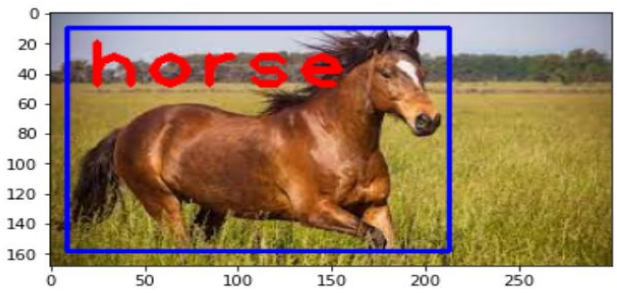

Fig 5 : Detection and labelling the image In YOLO

3. RESULT

After implementing Object detection using SSD Model with OpenCV we understood how exactly SSD model works and also we implemented object detection using pre trained model using the COCO dataset for images and videos with higher accuracies.

We obtained an accuracy of 72% with the SSD algorithm but when comparison with YOLO Algorithm we obtained an higher accuracy of 79% . As the new versions of YOLO keep emerging we will be obtaining higher accuracy hence YOLO is a comparatively better algorithm in comparison with SSD.

4. CONCLUSIONS

We can carry out object detection using many other algorithms like Region based Convolutional Neural Network which is RCNN, fast RCNN, faster RCNN. We got to

know that object detection using RCNN, fast RCNN, faster RCNN is having higher accuracy than object detection using algorithms like SSD and YOLO. But SSD and YOLO are having higher speed and also simpler architecture when compared to RCNN, fast RCNN, faster RCNN. These days people expect fast results and hence using YOLO and SSD for object detection would be a better option. Amongst SSD and YOLO it is better to use YOLO as it has better accuracy than SSD. As new versions of YOLO are emerging we can see the accuracy is improved tremendously. And no doubt that in future we can see more new versions of YOLO with much more accuracy. We can notice that these days object detection has a huge number of applications in many different sectors. Few of the applications of object detection are it is used to track the objects, count people, automated CCTV surveillance, person detection, vehicle detection and many more. Looking at the increasing number of applications we can definitely say that the field of object detection has a huge scope in the future. It will provide lot of job opportunities to people.

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CREDIT CARD FRAUD DETECTION USING DEEP LEARNING APPROACH

[1]S. Ranichandra, [2]P. Ganeshbabu, [3]V. Vaneeswari, [4]K. Saraswathi

Department of computer Science, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Email: ranichandras2523@yahoo.com (**S. Ranichandra***) Corresponding author:* S Ranichandra

ABSTRACT

Online transactions have grown dramatically in the last several years. Most of these swaps are charge card exchanges. This has resulted in an increase in the use of phoney credit cards and financial losses. Deceptive MasterCard exchanges are the most commonly acknowledged concern on the planet, despite the fact that there are several false exchanges affecting various monetary institutions in the online world. MasterCard fraud occurs when criminals abuse a Visa card for illegal reasons. As a result, the ability to recognise deceptive transactions is critical. Today, MasterCard misrepresentation is on the rise, compared to the past. Customers are tricked into handing over money by criminals who use a variety of ruses and deceptions. Find an answer to this kind of trick. In this suggested project, we aimed to develop a system for detecting extortion in Visa transactions. An important fraction of the capabilities needed to identify illegal and unethical transactions may be provided by the framework. As technology continues to evolve, it becomes more difficult to identify instances of illicit exchanges and activity. Data innovation sectors such as AI, computerised reasoning, and others are increasingly able to use technology to find solutions. You can automate this process and save some of the time and effort involved in spotting fraudulent MasterCard transactions. Visa usage informative indexes are initially gathered from customers, and arbitrary woodland computations and decision trees are used to organise them into producing and testing informational collections.. If you have a large amount of data, you may use this formula to break it down into smaller pieces. As a result, the accuracy of the results is increased. In order to deal with the regular extortion discovering credits, we have implemented some handling associated with the depiction of the graphical model for information perception. When an invention is shown, it is judged on the basis of its clarity and impact. 98.6 percent of the units in irregular forests exhibits are accurate.

Keywords: Credit card, deep learning, Random forest algorithm, Criminal transactions, Credit card, Imbalanced data, and fraud detection.

INTRODUCTION

Recently, online fraud methods have grown significantly in tandem with the exponential rise of internet financial models and the Internet sector as employed by traditional financial organisations. The credit card makes it easier for customers to keep track of their spending and where their money goes. As a result, clients are able to spend as much as they want, unlike the cash technique, which is limited to your wallet. Due to the fast advancement of technology in many fields, a growing number of businesses and organisations are increasingly conducting their operations entirely online. The consumer must get a credit card and complete the transaction in order to complete online transactions (e.g., online shopping) properly, which might take time and effort when making cash purchases. Fraudsters illegally operate by gaining access to credit card data, resulting in financial losses for both the firm and the customer.

Fraudulent activity is on the rise throughout a broad range of businesses, but it is especially prevalent in the financial sector. Credit card fraud is a major issue for financial institutions, and it must be addressed as quickly as feasible. Fraud detection systems must investigate to carefully handle in order to drastically limit the repercussions of credit card fraud. In order to predict future transactions, fraud detection systems learn from past ones. There are many fewer fraudulent instances in fraud detection than in the natural course of events. This results in an imbalance in the data. The skewed dataset contains a large number of examples of one dataset,

whereas the other dataset has a relatively small number of occurrences. When it comes to class distribution, machine learning techniques function well. Various treatments have been studied throughout the years to address the problem of skewed datasets. Data-, algorithm-, and ensemble-level solutions are typically offered in these studies.

Credit card fraud is the major focus of this study, which aims to detect fraudulent transactions. These transactions must be categorised as either fraudulent or non-fraudulent in order to achieve this goal The major objective is to develop a machine learning-based classification method for fraud detection that discovers fraudulent transactions quickly and accurately. As technology progresses, the use of cash decreases and the use of online payment increases, allowing fraudsters to conduct their operations without detection. A card number and expiry date are all that is needed for certain online payment methods, and that data may be lost without our knowledge. In other circumstances, we may not even be aware that our data is being taken. We don't realise that our personal information has been compromised through online transactions since fraudsters utilise phishing tactics to get the information. He just requires credit card information for a few transactions in order to commit fraud, and the user may not realise whether his/her credit card information has been compromised. There should be no disclosure of credit card information. However, there are moments when we have no control. Due to phishing sites, personal information may be disclosed, or the card itself may be stolen or lost. Machine learning may be used to determine whether or not a customer's spending patterns are consistent enough to be considered a fraudulent transaction.

Relative works [1] [2] Visa swaps, according to Sangeeta Mittal, ShivaniTyagi, and others, are the most popular charge card exchanges and associated scams nowadays. Fraudulently obtaining credit card information and then using it to make purchases on the internet is perhaps the most well-known kind of misrepresentation. In the midst of so many legitimate transactions, it might be difficult for Visa companies and sellers to spot these bogus transactions. AI computations can take care of this problem after enough data has been collected and made available. For the purpose of distinguishing Visa extortion in massively skewed datasets, we used guides and okara AI algorithms. Solo AI computations are able to handle imbalance and provide the most accurate evaluation outcomes, by accident. An extortion detection framework is a computerised system that Visa companies employ to identify fraudulent transactions before the end-users have had a chance to review them. It is the goal of this system to identify extortion before it is included in the fake exchange data set.. The ideal FDS should also minimise the strain on customers due to the pre-winter stoppage of exchanges. An estimating model for future information discovered in this region is characterised by processing a lot of example data in the default area using AI algorithms. Map learning calculations are the classes of these calculations, and the example information classes should be pre-marked.

It is widely accepted that charge card extortion is a major problem for online transactions in the monetary industry, according to PriyankaKumari and others. The rapid advancement of contemporary technology has resulted in deception and enormous financial losses in a wide range of financial sectors. A large portion of extortion identification is based on the use of a few order computations that are based on information mining and delicate registration. Classifiers in this article include Bagging, Random Forest, Classification by Regression, Voting, and Classification through Regression (CR), as well as several single classifiers that have been shown to be effective. These computations are evaluated by SMOTE, which uses three different informative indices to address the awkwardness problem in the classroom. Examining factors such as correctness, exactness, real positive or review rate, and fraudulent positive rate are critical to the process. An informative collection with limited order ascribes may benefit from increased sorter accuracy by promoting an extortion location model for selected credits. Structure the model to reduce computation and time requirements. For further testing, alternative combinations of sorters might be used. Sorters may be used with a variety of different informative sets.

[3] A steady decline has been seen in the amount of online transactions made by Dilip Singh Sisodia, Nerella Keerthana Reddy, and ShivangiBhandari, among others. The vast majority of these transactions are made using credit cards. Credit card fraud is also a major source of financial losses. As a result, fraud detection systems are critical for financial institutions like banks and credit unions. We employ resampling strategies to cope with

category imbalances since fraud is less likely to occur than ordinary transactions. Oversampling is being used here (SMOTE, SMOTE ENN, SAFE SMOTE, ROS, and SMOTE TL). This time, we used an ensemble of cost-sensitive classifiers (C4.5) and G-means to assess the performance of the resampled data. We found that the SMOTE ENN approach outperforms other classifiers on the oversampling technique set and the subsampling technique set utilised by TL in detecting fraud better than other classifiers. New algorithms may be developed or current algorithms can be modified to learn in a few layers using algorithm-level solutions. Before the basic classifier learning stage, the ensemble solution alters the ensemble learning algorithm by pre-processing the data or adding a cost-sensitive framework to the ensemble learning process.

[4] The problem of Mastercard misrepresentation recognition was offered by Abhimanyu Roy, Jingyi Sun, Robert Mahoney, Loreto Alonzi, Stephen Adams, and Peter Beling, among others, by enabling deep learning institutions to boost the usage of verifiable client information. We came up with a solid plan of action. Not only does it keep track of all of the trades that have taken place. An examination has demonstrated that deep learning tactics, such as angle-supporting trees and calculated relapse, provide the same outcomes as conventional misrepresentation finding procedures. While this may be true, a deep understanding of the world's geography is essential. The model's results are also influenced by the varied boundaries utilised to build it. This article focuses on geographical regions with time components, such as the inherent memory and long-term memory of normal counterfeit neural organisations, and geographical regions with different boundaries identified by the impact of extortion on the collection of recognition informational data. Thoughts on pre-ordered credit card exchanges and pre-ordered fraud. Misrepresentation recognition concerns, such as class awkwardness and adaptability, may be overcome with a better distributed computing environment. Examining how model boundaries impact misleading location execution offers us a clear path forward. For Visa extortion to be avoided and losses minimised, a technique of strengthening the bounds of deep learning geographies is also proposed in this document.

Current Mastercard counterfeits such as Sara Makki, Zainb Assaghir, Yehia Taher, RafiqulHaque, and Mohand-SadHacid all fall within this category. Do real damage to the basis of the economy and the lives of individuals. In this approach, identifying and avoiding extortion is essential for financial institutions. Detecting and avoiding misrepresentation is an expensive and time-consuming endeavour. In order to come up with new and innovative ways of identifying different forms of deception, a substantial amount of research has already been completed. However, these preparations proved to be useless. It's a well-known problem that the uneven character order causes problems. One of the best and most informative ways to categorise an index is to include certain categories that aren't well known. This problem deals with extortion, which has a limited legal scope, making it difficult for the grouping calculation to discriminate between legitimate and fraudulent practises. We shall conduct a detailed investigation of the uneven structure in this piece. Just like the AI algorithms that detect deception, we focused on these arrangements. We've identified their flaws and summarised the findings obtained via the informational gathering known as "charge card extortion.". Lopsided characterisation procedures are inefficient, as this article shows, especially when the information is very uneven, as this article indicates. Ogyeongbo and financial foundation expenses may be found in the white paper. It's possible that this may lead to an increase in extortion instances if people are mistakenly identified.

PROBLEM DEFINITION

Currently, cardholder information such as account numbers and credit card billing information are stored on physical cards. The charging system is set up in a certain way. The Payment Details will need an investment of time and money. After the person has checked the billing, the money is collected and disbursed. One additional record is maintained for the balance of the money charge owing. On the off chance that the purchase of the item is noted in a single record and kept up to date for purchasing purposes. Card Wise Details, Client Asterisk Data and so on were all put up in separate entries.

PROPOSED SYSTEM

It follows that the New System will be developed. Cardholders and application details are now updated as a result of the present framework. Setting up the bills and doing the math will cost some money. The person does,

in fact, examine the Cash Payment and the money received. If the purchase of the item is documented in a single record and that record is maintained for purchasing purposes. The Card Wise data, the Card Holder insightful data, and so on were all put up in separate records. This kind of job is very difficult, and it requires more resources and the maintenance of voluminous records. This job has generated programming that delivers a 'Visa System' of the multiplicity of items in general in the Credit Card to study this sort of work is shown in figure.1..

System Architecture

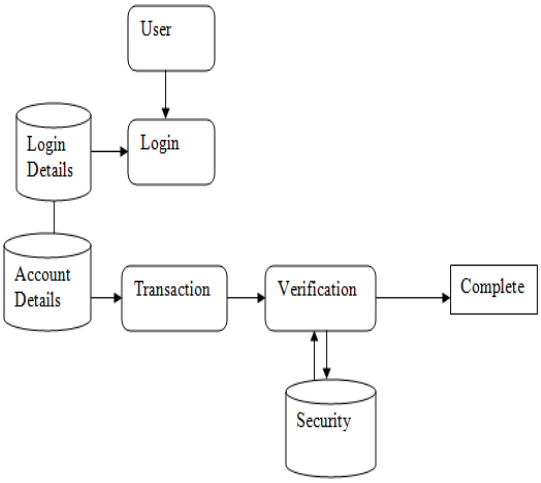

Figure.1. System Architecture

Fraud Detection

When utilizing ordinary methodology, distinguishing MasterCard extortion can be a troublesome assignment, so foster a MasterCard misrepresentation discovery model in ongoing scholastic and corporate networks. These models depend on most measurable information and computerized reasoning, and enjoy the hypothetical benefit of not monumental any presumptions on the info factors. A neural organization based extortion recognition framework utilized for training of Visa backers on enormous example charge card account exchanges. Contrasted and rule-based extortion identification programs, the organization recognize far less deceitful records and far less bogus up-sides. Past MasterCard exchange data used to produce an extortion scoring model. This report portrays how to utilize thickness based bunching strategies and outspread based useful organizations to arrange misrepresentation and non-extortion. The strategy tried against the extortion recognition issue and the primer outcomes acquired are palatable.

Dataset Description

The expectation information utilized in the misrepresentation model chiefly comes from constant exchange endorsement data and authentic data sets. Part of the exchange history data, non-financial data and inquiry data can be utilized. You have acquired an exchange information base with in excess of 40 fields. Because of the particulars of the classification understanding, we can't deliver every one of the subtleties of the information base construction or information content. Consequently, this article just shows a few factors of the normal information framework utilized by most banks. The information utilized has been named false or non-extortion by the bank. 0.07% of all records are false exchanges. We utilize all extortion information and some non-misrepresentation information tested from all non-extortion records as the preparation set. Information pre-handling is as per the following: missing qualities have been discarded. In view of the source variable, different changes are performed on the information as per the conveyance, like the making of logarithmic changes of various determined factors, information dioxidation or normalization. Then, utilize inferred factors to choose and separate provisions. In this manner, we have the last informational index for displaying.

Data Collection

The information utilized in this archive is a progression of item surveys gathered from charge card exchange logs. This progression is to choose a subset of all accessible information to be utilized. It is suggested that AI issues start with information whose target reaction is a lot of known information (models or perceptions). The information for which the objective reaction is known is called label information.

Models on Credit

In light of a bunch of information created by worldwide public area bookkeeping firms, an incredible and all inclusive subjective reaction model for anticipating business extortion. The model incorporates proficient checking and coordination's innovation. The outcomes show superb prescient force for symmetric and hilter kilter cost houses. In light of Ki Sorter, we have constructed a web-based framework for recognizing misrepresentation in MasterCard exchanges. The non-straight form of Fisher discriminant examination is utilized to guarantee precise model arrangement. The framework is completely functional and right now oversees in excess of 12 million exchanges each year, and the outcomes are extremely acceptable.

MODULES

- Login
- Registration
- Mobiles
- Purchase
- Login details
- Purchase details

MODULE DESCRIPTION

Login

This part will assist you with signing in from the enrolment page and purchase all telephones safely.

Registration Form

On the off chance that clients don't buy items through this site, however need to utilize the help region to take care of versatile issues, kindly utilize the enlistment structure to turn into an individual from this site. Clients need to give the data they need to acquire a part ID that can utilize the assistance region work. Clients who buy items through this site become individuals from this site and acquire a part ID

Mobiles

Clients can purchase cell phones through this site. You can utilize the quest choice to look for all mobile phone models, everything being equal. You can likewise see all models, all things considered.

Purchase

The rundown of telephones is shown on a gigantic page. You can choose a model and add it to BASKET. The chose model has been transported to the location you signed in with the enlistment subtleties. It was transported inside seven days.

Login Details

The client can see the login use time and the point by point data of the incorporated IP address of the login framework. It can assist you with getting more data about extortion.

Purchased Details

The client can see the itemized data of the things bought from the framework IP when signing in.

Credit Card Fraud Detection

- Inner card fraud
- External card fraud

Internal card misrepresentation means to dupe the money. Typically it is the agreement among shippers and cardholders, utilizing bogus exchanges to dupe banks cash. Outside card misrepresentation is essentially typified at utilizing the taken, phony or fake MasterCard to devour, or utilizing cards to get cash in masked structures, like purchasing the costly, little volume products or the wares that can undoubtedly be changed into cash. This paper is mostly given to the examination of the outside card extortion, which represents most of Visa cheats. In this review, three order techniques are tried for their relevance in extortion location, for example choice tree, neural organizations and calculated relapse. The three strategies are looked at as far as their prescient precision.

The figure information utilized for the misrepresentation models were essentially come from the continuous exchange approved data and the set of experiences data set. Exchange posting data, Non Monetary Info and Inquiry data at times were utilized in a specific degree. An exchange data set including in excess of 40 fields was got. Under the provisions of our nondisclosure arrangement, we cannot uncover every one of the subtleties of the information base pattern, nor the substance of the information. So in this paper us just rundown few factors which are normal information pattern utilized by the greater part of banks. The information utilized was at that point named by the bank as extortion or non-misrepresentation. Of the multitude of records, 0.07% is extortion exchanges. We utilized all extortion information and some non-misrepresentation ones which were examined from all the non-extortion records

Random Forest Algorithm

Arbitrary timberland is a guide AI calculation dependent on outfit learning. Gathering learning is a calculation that gets forecasts through various mixes and blends of various and comparative models. The name "arbitrary timberland" is utilized in light of the fact that the irregular woods calculation works comparably and utilizes numerous calculations and different choice trees to make a tree woodland. Arbitrary timberland calculation can be utilized for relapse and arrangement exercises.

Algorithm process

The Random Forest calculation functions admirably regardless of whether the information contains missing qualities or isn't measured accurately. Thusly, we utilized this irregular backwoods calculation and choice tree calculation to explore conduct and concentrate exact extortion discovery rates from explicit datasets. A disarray lattice is basically a synopsis of expectation results or tables used to depict the presentation of a classifier in a test dataset whose genuine qualities are known. Envision calculation execution and effectively recognize classes. Subsequently, it not just computes most execution estimations and gives knowledge into the mistakes that happen in the order model, yet in addition shows the kind of blunder. The prepared and test information are addressed by a disarray grid that addresses:

- TP: True Positive addresses real information that clients are defenceless against extortion and are utilized for preparing and exact forecast.
- TN: True negative addresses flighty information that doesn't coordinate with the extortion target information.
- FP: False up-sides are normal, yet the information isn't influenced by extortion.
- FN: No phony voice is normal, yet the information might be mock.

Feature extraction

Component extraction is the most common way of considering and examining the conduct and examples of information and planning highlights for additional testing and preparing. At long last, our model is prepared utilizing the classifier calculation. Utilize the characterization module in Python's Natural Language Toolkit library. Utilize the gathered marker informational index. The leftover named information will be utilized to

assess the model. Some AI calculations are utilized to order pre-processed information. The chose classifier is arbitrary woodland. These calculations are exceptionally famous in text characterization exercises.

Evaluation model

Model assessment is a fundamental piece of the model improvement process. It can assist you with tracking down the best model that addresses your information and how your picked model will function later on. Utilizing information for preparing to assess model execution is inadmissible in information science since it can undoubtedly produce hopeful and over-adjusted models. To stay away from over fitting, use assessment techniques like environmental and cross-approval to test the presentation of the model. The outcomes are shown in the showcase design. The arrangement information is addressed in a graphical organization. Precision is plainly characterized as the proportion of exact forecasts to test information. It tends to be effortlessly determined by the numerical estimation of separating the quantity of exact expectations by the quantity of complete forecasts.

By contrasting the proposed innovation and the current innovation, we tracked down that the exhibition of the proposed innovation has improved. This proposed irregular backwoods calculation gives better precision to looking at SVM, Logistic and nearby exception calculations. Irregular Decision Forests and Random Forests are bunch learning procedures for arrangement, expectation, and extra work. They develop an enormous number of choice trees during the time spent practice and structure classes as modules (arrangement) or normal expectation. (Return) Independent tree. Arbitrary choice woodland adjusts to the element of over fitting the preparation set by the choice tree.

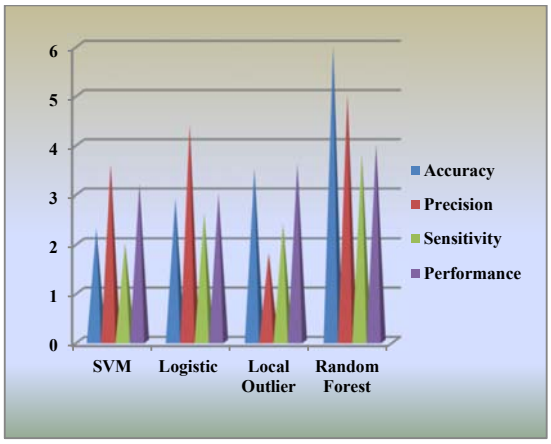

Figure.2. Performance Analysis

CONCLUSION

Document yearnings have become more normal in the beyond two years. One of the fundamental difficulties looked by dangerous banks is to foster dangers normally, deductively and considerably at the level of the top managerial staff of brokers by developing an exact, productive and sensible Visa hazard control structure. The survey utilizes three gathering procedures to audit the recorded information of business Visas and control energetic acknowledgment designs. We covered our work and exhibited the advantages of data mining developments, including the revelation of the sensory system of Visa excitement to decrease banking hazards, vital misery, and decision trees. Subsequently, we utilize a better than ever arbitrary backwoods calculation to catch the outcomes and the precise charge card extortion location esteem is 0.9994802867383512 (99.93%). Contrasted and existing modules, this proposed module can be applied to bigger informational indexes and give more exact outcomes. The arbitrary backwoods calculation gives better execution to a lot of preparing information, yet it actually dials back during testing and application. It is additionally useful to utilize numerous

pre-handling procedures. Our future errand is to communicate this in programming applications and endeavor to utilize new advances, for example, AI, computerized reasoning, and profound figuring out how to give answers for MasterCard extortion.

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Advanced IOT Based Pollution, Temperature Detection Using Raspberry PI Controller and Mobile Application

[1] Kiran Kumar V, [2]Dr. Venkatesh Prasad K S

Authors affiliation, school of computer science and engineering, REVA University, Bangalore

Abstract.

With huge increase in population, has resulted in extreme demand for food, water, home, electricity, roads, cars, and numerous different commodities. These demands have created large, tremendous amount of strain on our natural resources and contribute to contamination of the land, water, and air. Examining the destruction and depletion of our treasured natural resources is an urgent necessity. To protect and improve the standard of our environment, the Republic of India's government created the Environment (Protection) Act, 1986 to regulate environmental pollution (land, water, and air). Thermal wastes streaming out of electricity-generating units, e.g., thermal control plants constitute another vital category of pollutants. Thermal wastewater reduces or eliminates the total number of creatures that are sensitive to high temperatures, and it may improve plant development in extremely cold environments, but only after harming the inborn greenery and fauna. This paper presents IoT based pollutant gas (e.g. CO - Carbon Mono-Oxide by using MQ-2 sensor) and temperature (by using DHT-11 sensor) are monitored with 2 different approaches by using android application based on users' current location. Approach 1). In this approach, an IOT-based method using physical controllers Raspberry Pi and hardware sensors are integrated to constantly check the Air Quality Index at sensitive areas where elderly people reside. Approach 2). In this approach, if smart devices itself are equipped with sensors for gas and temperature detection, it would be very easy and better analysis could be done at based on current location of the user with the help of mobile application.

Keywords. CO, MQ-2, DHT-11, AQI, Mobile Application.

1. INTRODUCTION

With huge increase in population size has resulted in extreme demand for food, water, home, electricity, roads, cars, and numerous different commodities. These demands have created large, tremendous amount of strain on our natural resources and contribute to contamination of the land, water, and air. Examining the destruction and depletion of our treasured natural resources is an urgent necessity. In existing systems, the pollution board authorities ought to deploy necessary controllers together with sensors to at numerous locations and may visualize data that are deployed to IoT Cloud (Thing Speak) with the

assistance of web or mobile application. The applications that are designed shows the information selected at specific location. If the user is travel, then the prevailing system fails to show the near controllers real time data. In this paper, we've have proposed two completely different approaches to monitor the pollutants based on the data gathered from numerous locations of the controllers being installed, dynamically supported by user's location using smart devices likes Mobiles, Tablets. Laptop etc.

2. INTERNET OF THINGS

With the large increase in usage of smart devices, through internet one will communicate with another device. Internet of Things is that the most well-liked technology which will provide solutions to real time watching of the hardware system from remote location and save the information gathered from these devices over Cloud Storage. With IoT we tend to could retrieve the information, perform some statistical analysis, and forecast an equivalent to the public authorities or to the end user.

3. LITERATURE SURVEY

Several papers have been published on pollution monitoring system.

A system has been built [1], in which the authors proposed to build a system to continuously monitor various pollutants that are released from various industries by installing physical hardware devices like Arduino Controllers, MQ-2 gas sensors and DHT-11 temperature sensors.

A system has been built [2], In which the authors have proposed a system to monitor 7 various kinds of pollutants with the help of physical hardware resources installed at various locations at regular intervals of time and if the pollutants that are released from the industries goes beyond the user's pre-set value, an e-mail or SMS will be delivered.

A system has been built [3], in this project with the help of Node MCU micro controller's authors have proposed a system that can sense the real time data of various pollutants through gas and sound sensors that are saved in IoT Cloud and report the same to public authorities.

A system has been built [4], In this paper, authors have proposed a system that can sense the real time data (by using MQ-6, MQ-7 MQ-135) of various pollutants deployed at workshops and commercial buildings that are saved in IoT Cloud (Google Cloud Platform) and report the same to public authorities.

A system has been built [5], in which the authors have proposed a system to build with raspberry PI 3 model along gas sensors like humidity sensor DHT-11, MQ-2 / 7 gas sensors and interfaced 2714 NO2 sensors that can send values being read from these sensors to Thing Speak IOT Cloud.

4. HARDWARE DESCRIPTION

To demonstrate, we have used two different sensors, MQ-2 gas sensor to detect CO and DHT-11 to detect humidity/temperature.

a) DHT-11 Sensor

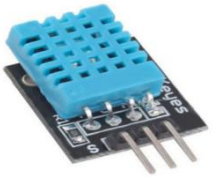


Fig 1. DHT-11 sensor

DHT-11 is used to sense temperature and humidity. DHT11 are often interface with any microcontroller like Arduino, Raspberry Pi. It has high reliability and glorious semi-permanent stability. The digital signal is straightforward to scan victimization any microcontroller. Only three connections are expected to be made to utilize the sensor - Vcc, Gnd and Output.

b) MQ-2 Sensor

Fig 2. MQ - 2 CO Gas Detection Sensors

MQ2 is one in every one of the generally involved gas identifiers in MQ sensor series. It's a Metal chemical compound Semiconductor Gas detector additionally called Chemiresistors because the detection is predicated by varying the obstruction of the detecting material. Once the gas comes in touch with the fabric. Employing an easy resistance network, convergences of gas might be distinguished. MQ - 2 indicates the kind of gas within the type of associate analog signal and an Analog-to-Digital device MCP 3008 is employed to convert it to digital and interface to the Raspberry Pi.

c) MCP 3008

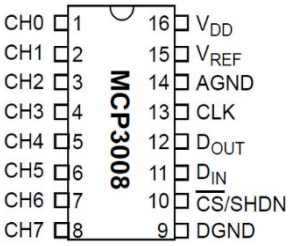


Fig 3. MCP 3008

The MCP3008 is a negligible cost 8-channel 10-bit Analog to Digital converter. The MCP3008 associates with the Raspberry Pi utilizing a SPI sequential association. We can use either the hardware SPI transport, or any four GPIO pins and programming SPI to banter with the MCP3008. To connect the MCP3008 to the Raspberry Pi with a computer code SPI affiliation you would like to create the subsequent connections:

MCP3008 VDD to **Raspberry Pi 3.3V**
MCP3008 VREF to **Raspberry Pi 3.3V**
MCP3008 AGND to **Raspberry Pi GND**
MCP3008 DGND to **Raspberry Pi GND**
MCP3008 CLK to **Raspberry Pi pin 18**
MCP3008 DOUT to **Raspberry Pi pin 23**
MCP3008 DIN to **Raspberry Pi pin 24**
MCP3008 CS/SHDN to **Raspberry Pi pin 25**

Fig 5. MCP Wiring with Raspbeery PI Controller

5. PROPOSED SYSTEM

In this paper, we have proposed two different approaches to monitor CO pollutant by using MQ-2 gas sensors that are hazardous to human life. We have as well as temperature sensors (DHT-11) to detect the maximum temperature/humidity and the same can be used for necessary action against the organization responsible for disposing of such exceeded level of pollutants by Government authorities like National Pollution Control Board. The project can also be used to monitor other hazardous pollutant agents like SO2, NO2, Lead, PM2.5 etc. With the increase in usage of smart devices, we have proposed a system to make public also be aware of various pollutants in the nearby areas by using an Android Application. In existing system, several applications that are being developed helps in visualizing the data by selecting a specific location of the devices being deployed. But in our proposed system, the application is developed in such a way that the user when using the mobile app can easily get to know about all the nearby controller (devices/ stations) data dynamically with the help of GPS sensors data embedded within the mobile devices.

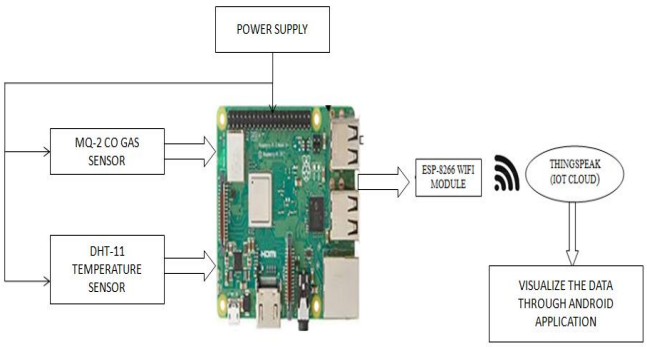


Fig 6. Architecture Design Specification

A. Approach-1 - By using Micro-controllers and sensors

In this approach, the physical hardware devices like Raspberry PI, DHT-11 and MQ-2 gas sensors are interfaced and deployed at varied locations within the town. Raspberry PI controllers contain an in-built support for Python programming language. With the assistance of adafruit- library imported to python language, we could read the sensors data. The data that has been read are basically an analog signal that must be regenerate to digital numerical and MCP 3008 ADC Controller is getting used. The data in Thing Speak can be used to perform certain statistical analysis to forecast the data based on Time Series Machine Learning Models.

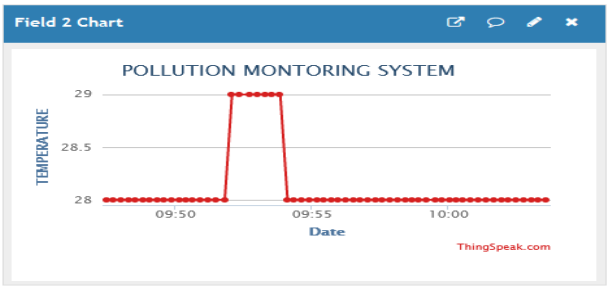


Fig 7. Sample Temperature Sensors data being recorded at Thing Speak

If the user is travelling, with the help of android application being developed, can get to know information about various pollutant agents that's being gathered by all the controllers which is at 5 KM of radius from the current location of the users. The mobile application also has an option to pre-set the maximum threshold value for Temperature and Carbon-Mono-Oxide. If the controller is reporting beyond the pre-set value when the user is travelling, then he/she gets an immediate notification as "Bad Status" for travelling in that area and necessary action can be taken against it. When the location is changed, automatically this application would display all the device/stations data that are being gathered in IOT Cloud based on user's current location at 5 KM.

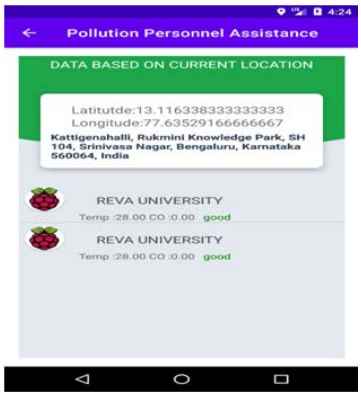


Fig 8. Displaying Controller recorded data near by REVA University.

In the above snapshot, the application shows the user is currently at REVA University and there are two controllers available at 5 KM and the pollutant or temperature is not more than the pre-set value of the end user. For testing purpose, we have simulated the data to be the same for both the controllers. The user can click on any one or the controller listed above and can visualize the last 7-, 15- or 30-days report and can take necessary action.

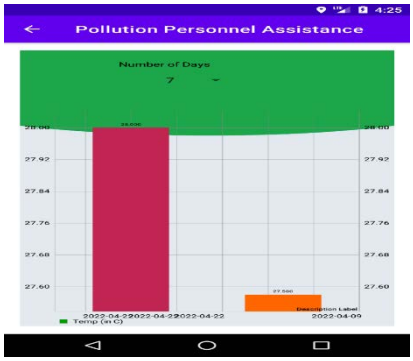


Fig 9. Application showing last 7 days report of specific controller chosen

If there aren't any controllers being placed at a distance of five kilometres of radius from user's location, the application would show "No close Controllers data Found!!!"

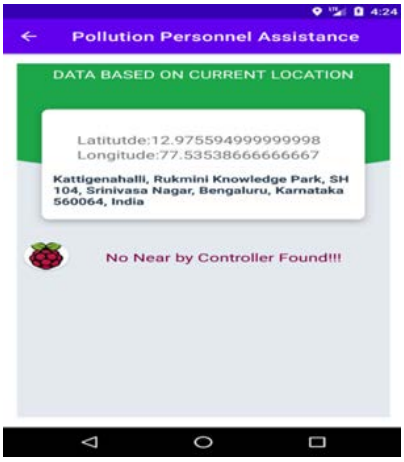
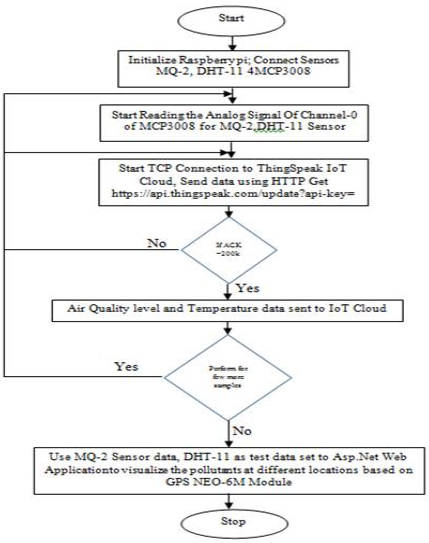


Fig 10. Displaying No Controller data near by REVA University

B. Approach-1 -Proposed System Flow chart



B. Approach-2 - Smart Device Embedded Sensors data visualization

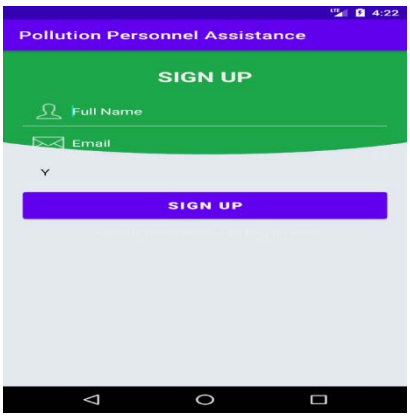


Fig 11. SIGN UP Screen of Android Application

In the previous approach, concerned pollution control board authorities must install the devices/stations at various locations where the pollutants are reported in high. It would be very difficult for the Government/Concerned Authority to install and provide continuous power supply and also maintenance, all together incurs more cost. To address these issues, in approach 2, if it is possible for smart device manufacturers to embed gas sensors (Compact MQ -2 example) and temperature sensors at the back panel, then within android application at the time of registration of the user for the first time, SIGN UP has an option (third option as shown in above activity) to read the current location of the users. If the user has agreed upon to share current location along with embedded sensors data, then whenever the application is running in background, the current location of the user will be saved to the database along with the temperature and gas sensor values that it has read at the time of being in that area. If no, then user's current location information will not be sent to our database.

With this tecnique has a very feasible solution to overcome the difficulties in isntalling and maintaining the physical devices for the concerned authority and 24/7 authorities has to keep an eye on the system installed. To overcome all these problem we have automated a system with the help of android based application which gives information directly to the end user (pubilc) and also Government can make use of this data for forecasting the data for next few days by using ML algorithms.

For example, if a client is at REVA University, then the application has been designed in such a way so that it will get to every one of the devices information close by the client's location at a radius of 5 KM. There could be a few clients around REVA University who have introduced our application on their savvy gadgets and furthermore given the authorization to save their continuous current area data. Subsequently that multitude of information will be collected in view of number of cases of the information and a similar will be provoked to the client's console. At first when the activity is opened, it will show the ongoing client's location with the help of GPS sensor. Android upholds Location Listener interface that can be utilized to follow the client's area in view of scope and longitude.

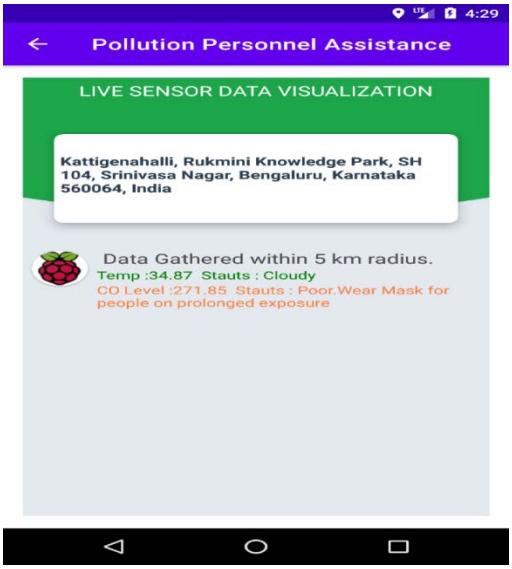


Fig 12. Live Sensor Data Visualization with data shared from smart devices.

In Real time situation, at a particular location there could be hundreds and thousands of savvy devices being utilized inside a span of 5 KM and the best part is every one of the devices are utilizing our application, then the continuous temperature and gas sensors information are stacked in the data set and the equivalent can be utilized for conglomeration. But for development and testing purpose, whilst this activity is opened, we've simulated inside to load about 25 facts for every of the sensor records (temperature and CO pollutant gas values), in order that the records may be aggregated from all of the smart devices (like laptops, mobile, tablets etc.) that are at a radius of five KM.

6. FUTURE ENHANCEMENT

In this paper, we proposed a system that carries out the contamination checking arrangement of Temperature and Carbon Mono-Oxide gases without actual deployment of devices/stations however with built-in sensors of shrewd gadgets considering client's ongoing area. So, when the area of the clients is changed consequently our application will ascertain the information that is amassed from the brilliant devices which are at area of the client's area a good ways off of 5 KM of span. In this task, the information is additionally saved IoT Cloud Thing Speak. Further, a similar activity can likewise be reached out to forecast the various sensors and temperature information for a week or custom number of days in view of the investigation of the information that is being put away at Thing Speak IoT Cloud by using machine learning algorithms.

7. CONCLUSION

In this project, proposed a system that can continually monitors air quality in an ongoing area and showcases the air quality on the android application not only for the concerned authorities but also for public users. In this undertaking we are attempting to carry out the contamination observing arrangement of Temperature and Carbon Mono-Oxide gases without actual establishment of devices and gadget/stations yet with implanted sensors of smart devices considering client's ongoing area. So, when the location of the clients is changed consequently our application will work out the information that are collected from the brilliant gadgets which are at area of the clients area a good ways off of 5 KM of range.

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Intrusion and Detection for Cloud Computing

R.Jothi, R.Nikila,P.Anitha

Department of computer Applications, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Email: jothi47859@gmail.com ***(Jothi R)*** *Corresponding author: Jothi R*

ABSTRACT

A Virtual Machine Introspection based adaptable and efficient security engineering plan for fine grained checking of the virtual machines to detect recognized assaults and their variations. We have created procedures for observing the TVMs at the cycle level and framework call level to identify assaults like those dependent on malignant concealed cycles, assaults that incapacitate security apparatuses in the virtual machines just as those that adjust the conduct of the authentic applications to get to delicate information. Our concept, VM Guard, employs the reflection includes at the VMM-layer to investigate framework call indications of projects running on TVM. VM Guard employs the product breakpoint infusion approach which is OS sceptical and utilised to trap the execution of projects. Inspired by the content mining draws closer, VM Guard presents 'Pack of n-grams' methodology coordinated with Term Frequency-Inverse Document Frequency approach, to extract and pick highlights of ordinary and assault follows. It at that point uses the Random Forest classifier to give a nonexclusive behavior for different classes of interruptions of the examined TVM.

Keywords: Energy efficiency, VM migration, workload prediction, cloud computing.

INTRODUCTION

Reducing datacenter energy consumption has recently attracted significant attention from the scientific community as well as industry. Datacenter personnel often labour between 10% and 50% of their maximum capacity, according to ongoing studies. These same tests, however, also reveal that employees that are maintained ON but are inactive or hardly utilised use enormous amounts of energy, since an inactive ON worker consumes more than 50% of its maximum power. Consequently, it is reasonable to assume that in order to reduce datacenter energy consumption, it is necessary to consolidate cloud workloads into the smallest possible workforce. For example, virtualized physical computers that include applications and shared capacity devices like NFS reinforcement workers are examples of distributed computing. Server consolidation and load balancing have grown in importance for on-the-fly asset management in a virtualized environment. Several apps operate on a virtual machine in a virtualized environment where one VM is scheduled for every physical system in the datacenter. With the capacity to run many apps on one PM and the ability to transfer them across multiple PMs, numerous issues arose... As a result, attention is focused on ensuring that processing assets are effectively used to serve application responsibilities in the Cloud datacenter in order to limit energy consumption, which includes adjusting load across all PMs, figuring out which VMs to put on which PMs, and overseeing surprising increases in asset requests [1]-[7].

PROBLEM DEFINITION

In the current era of data processing, cloud security is of paramount importance. On detection of the existence of a security device in an inhabited virtual machine, progressed malware may encrypt their actions. As a result, TVM-layer security is unreliable. VMM hides the complexity of the basic hardware and software, allowing several TVMs to operate on a single physical computer. In these virtual computers, the occupants may run a variety of working frameworks and apps. TVMs are vulnerable to a variety of

attacks because of the present operating systems and apps, which are unpredictable and contain a few holes that may be exploited by the attackers [8]-[17].

PROPOSED PROCESS

It has been shown that VM Guard performs effectively in identifying attacks on programmes. Disruption attacks include a perpetrator making obnoxious alterations to legitimate projects with the intent of obtaining sensitive data about the target's inhabitants or doing some nefarious action on the system. These attacks use a nasty set of system calls that are being deciphered by VM Guard. Predicts future asset usages of vms that have been booked, and uses these predictions to decide on effective cloud asset over responsibility choices to develop use. An SLA violation may be avoided by preemptively moving virtual machines to avoid overburdening the PM queue. By determining which VMs need to be relocated and which PM files need to include the relocated VMs, it is able to accomplish VM relocation while using as little energy as possible and minimising the number of dynamic PMs created.

RELATED WORK

Researchers from [1] include C. Weng, X. Lu, X. Wang, and M. Li, et al. In a single hardware PC, system virtualization may combine the convenience of many independent PC architectures. To maximise hardware efficiency while minimising power consumption, it is critical to use multi-focus processors in the pack structure to virtualize the figures' central points. Packet handling centres are equipped with a variety of virtual machines. A provocative problem would be to modify the duty in virtual machines at each legitimate enrollment centre point, which is not similar to the store balance of the conventional bundle system, in this way. The virtualized pack structure should have an organisational structure, as well as an unique execution tuning technique, to alter obligations. On a virtualized heterogeneous pack system, we put the tuning approach into practise on a working model of the organisation structure based on Xen. To better exhibit a virtualized bunch structure, we were able to use an organisation design and tweaking technique.

in which C. Clark, K. Fraser, S. Hand, J. G Hansen, E. Jul, C. Limpach, I. Pratt, and A. Warfield et al. Working structure migration is a crucial tool for the leaders of worker homesteads and packs. It provides for a clean separation of equipment and programming and energises insufficiency in the chiefs, load changes, and low-level system maintenance. It allows for a clean division of equipment and programming. We demonstrate the transfer of full OS events on an item gathering, recording organising individual events as low as 60ms, by completing the great bulk of development while OSes are still operating. We demonstrate that our presentation is adequate to make live development a useful tool for workers pulling heavy weights. In this study, we concentrate on worker homestead and bundle situations while making arrangement options for shifting OSes operating organisations with liveness demands. We describe and investigate the concept of a writable working set and demonstrate how the Xen VMM is used to organise, execute, and evaluate the primary OS movement.

It is difficult to move Virtual Machines from one real host to the next, as described in [3] by Z. Liu, W. Qu, W. Liu, and K. Li et al. Despite this, the complexity of these virtualized situations offers new organisational issues. Many typical ways may not be suited for lowering individual time or development time, or for Xen VM stages. Sadly, this is the reality. In this study, a new Slowdown Scheduling Algorithm for Xen live VM development is described in detail. CPU resources allocated to movement space are reduced appropriately in our SSA framework. To put it another way, a reduction in CPU activity reduces the pace at which pages are being corrupted. It is clear that our SSA technique may reduce both the overall movement time and individual movement time clearly in an unsanitary page rate situation.

In [4], W. Voorsluys, J. Broberg, S. Venugopal, and R. Buyya et al. present Virtualization has become commonplace in today's worker ranches, referred to as "figuring fogs" from time to time. The limit of live migration of virtual machines delivers positive circumstances like better execution, reasonableness and changeover to non-basic disappointment while permitting duty advancement with a brief assistance individual time to be achieved. In any case, a live protest will almost certainly have a negative effect on the employment levels of the many organisations involved. As a result, a common understanding of the implications for structure execution is desirable. Virtual machine live migration is examined in this research to see how it affects Xen virtual machine consumption. There is no way to ignore the need for real Service Level Agreements to handle openness and

responsiveness in systems when development overhead is adequate, but this cannot be ignored altogether. Despite this, worker farms servicing current Internet apps have a great potential for live development compatibility. Based on a duty to cover all staggered Web 2.0 apps, our outcomes are a success.

In [5] Y. Luo, B. Zhang, X. Wang, Z. Wang, Y. Sun, and H. Chen et al. describe the results of their work. In this work, we provide a live development plot of the virtual machine's whole structure, including CPU state, RAM data, and neighbourhood circle storage. We suggest a three-stage development figure to limit the individual time obtained by moving enormous circles of storing data and to maintain the authenticity and consistency of data. Continuous migration is used to reduce the amount of data that must be transported in order to nudge the development back toward the beginning machine. In order to track the progress of the make as it nears completion, a square bitmap is used. The square bitmap is responsible for synchronising the development's nearby circular storage. When I/O-intensive jobs are operating in the relocated VM, assessments reveal that our counters do their job admirably. It takes roughly 100 milliseconds for the migration to get out of the way. It takes less time to migrate a large number of users while utilising IM. The synchronisation tool based on a square bitmap is simple and effective. Recording any changes made to the relocated VM has a very little execution overhead.

Researchers R. Bradford, E. Kotsovinos, A. Feldmann, and H. Schioberg present in [6] In terms of relocating VMs, the emphasis has been on the run-time memory state. However, for wide-area network growth, moving the VM's image as well as moving its close-by permanent state and its ongoing associate connections is critical. This paper addresses both issues: First, we show that we can move an entire running web specialist, including its local steady state, with unimportant interference in the LAN and the WAN; second, by combining dynDNS and tunnelling, existing affiliations can continue direct while new ones are redirected to the new association territory. After that, we demonstrate that it is possible to provide system support for migrating virtual execution circumstances in the broad zone by combining exceptional solutions in a new way.

Process Control SECURE KEY GENERATION

The Client's PROCESS RESOURCE SCHEDULE OF MANAGEMENT PROCEDURES

Chiefs link is an approach to defining objectives and driving the development, for example, an undertaking (project board cooperation) or an undertaking (project the board collaboration). An exchange of ideas (measure the heads cycle, a portion of the time insinuated as the cooperation execution assessment and the load up system). It's possible to do a variety of tasks in the management module, such as:

An increasing number of virtual machines are allocated to lower-situated workers, resulting in a decrease in their productivity and an increase in labour turnover. Also keep in mind that Multistage DA is only getting started. The records may be dealt with by the head in the exchange of a cloud archive.

ii) VIEW FILES

The executive will shuffle the archive between the client and the overseer as they download records. They are able to access the documents that have been relocated. The customer will be able to access their records. In terms of speed, precision, and capacity, Structure consistently performed at the highest level. The records that have been downloaded may usually be dealt with regularly is shown in figure 1.

ii) DOWNLOAD

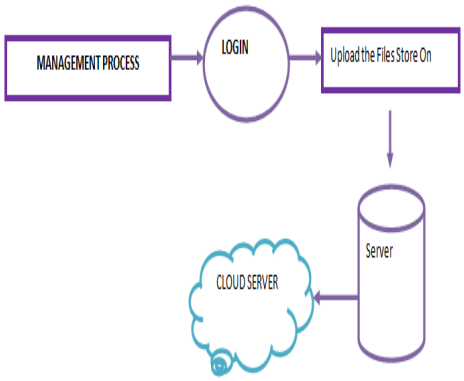

Fig 1 Download a File

SECURE KEY PROCESSING AND VERIFICATION

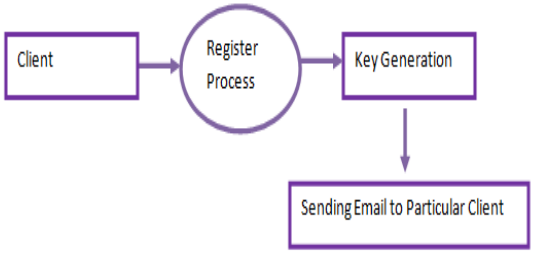

Fig 2 Secure Key Processing and Verification

When a client receives a key from a Secure Key Processing module, that key is sent to the customer's particular email address, which is required for convenience. A customer's character is checked to see whether they are approved when the route is introduced into the system is shown in figure 2.

PROCESS OF THE CLIENT I FILES SEARCH

Records may be moved and reports can be seen by both parties.

The head may move the records based on the user's requirements, and the client can browse at the records from the head.

Second, DOWNLOAD

Each section of the posting list is referenced at the time of solicitation. Our team is focused on regaining the upper hand. Top-k recovery is almost as fast as it is in plaintext for the worker. As an example, the worker doesn't have to cross all the posts for each covered route, but rather uses a tree-based information progression to present the relevant list. As a result, the time spent searching for information is almost as productive as the time spent searching for information is shown in figure 3.

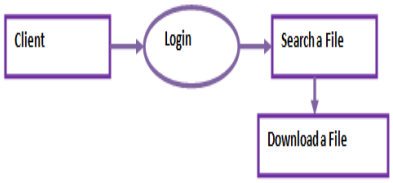

Fig 3 Download

MANAGEMENT OF RESOURCE AVAILABILITY

Asset provisioning that encourages SPRNT to liberally produce the asset task in each assortment cycle as commitment increases is essential. Over-provisioned assets are initially approached using this mechanism, which then reduces them if the major demands are satisfied. A system called SPRNT has been proposed in this study to ensure the quality of service (QoS) by dynamically altering the number of virtual machine events. The basic idea behind SPRNT is to abuse a serious methodology in order to design assets that are likely to surpass the certified necessities, fulfil the presentation requirements at the most reliable reference point in the collection cycle, and reduce over-provisioned assets if necessary in the subsequent time. Rather than a fixed quantity of assets, the commitment power and provisioned assets are used to determine the amount of assets that may be handed out at any particular moment. MANAGEMENT OF RESOURCE AVAILABILITY

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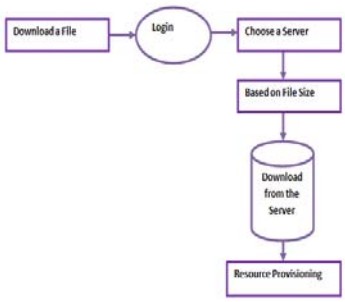

Fig 4 Resource Provisioning

ALGORITHM DESCRIPTION

ALGORITHM MULTISTAGE

Iterative multistage DA calculation repeatedly sorts out common weakly stable occupations for each stage. Disappointingly, the position of discouragement is removed from its previous machine so that it may provide new ideas to machines that have

previously accepted it. This ensures that no new sort with obstructive sets is passed on throughout the calculating process. As the project progresses, we revise DA to include the chosen collection of job proposals and the whole game plan for machines with empowered limits.

ALGORITHM ONLINE

When it comes to web masterminding, the decisions on how to configure tries are made at a later date. The decisions of the mastermind are based on the demands of the company, which are either lawfully or statically distributed. Prior to the start of building, static, need-driven figures distribute the set needs to the tasks. It is necessary to delegate the needs to tasks at runtime in dynamic need-driven modelling. The evaluation of online calculations has zeroed attention on the danger of dynamic that is possible in this situation, since an internet calculation is forced to settle on choices that may later reveal up to be less than ideal. To guide the action cycle and foresee the innovative asset interest of VMs, the online VM condition creates frameworks that restrict the substantial time **and cost control between VMs. Online VM conditions**

CONCLUSIONS

In order to examine TVMs at the affiliation and framework call levels in great detail to identify known attacks and their variations, use a staggered VMI-based security planning strategy. VM Guard is activated at the VMM's Dom0 location. The suggested ID instrument, BonG, which combines text mining VMI and AI approaches with the UNM dataset and subtle malware dataset, has a unique zone of accuracy in spotting abnormalities. VM Guard is an acceptable choice for cloud environments since it provides an additional layer of security. If an IDS intrusion is hindered, the cloud boss may control and monitor VM Guard from Dom0 of VMM. In order to become settled with the lead of known harmful and optimal errands, VM Guard uses guided AI computation. A malware that arrives after a well-researched malware that is near to an attack would be given a high level of censure if it is discovered. similarity with the learned assault class.

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Nestohh: Mobile App for Paying Guest Management

Prajwal M Patil, Ovijeet Sengupta, Naidu Pawankumar Damodar, Parikshit
Rohit Pravin Srivastav, Prof. Chaithra M H

School of Computer Science and Engineering,
REVA University, Bengaluru.

Abstract.

Mobile apps are the recent virtual marketplace and are used for various day-to-day purposes; seeing the paradigm shift, we have developed an app "Nestohh" for listing and managing paying guest accommodation. Finding good paying guest accommodation physically is complicated and time-consuming and non-transparent. Our cross-platform mobile app (i) lists nearby rental paying guest vacancies with amenities, (ii) provides maintenance support for users once they start living in a PG, and (iii) offers a payment gateway to pay monthly rents. To make it reliable and cross-platform (available on android and iOS), the native app development framework Flutter is used integrated with Google Firebase services and Razorpay. The target users are people who leave their hometowns for studies, jobs, etc and shift to new cities. When a user checks in the app, they must sign-up and log in and a list of PGs shows up. They can check amenities, make a wish list, and further book and manage. The easy-to-use interface and interactive design make PG hunting an easy experience.

Keywords— App, Cross-platform, Flutter, Paying guest (PG), Payment.

1. INTRODUCTION

When someone new comes to a city, she needs shelter over her head that is near to her workplace, safe, filled with amenities, well managed, and within budget. Finding a good-paying guest facility can be overwhelmingly hectic and time-consuming. Physically comparing prices, and amenities and making payments isn't always a pleasant experience. With the expansion of educational institutes and office spaces in cities, paying guest facilities are booming exponentially. A mobile app to manage customer demands and provide them with needed services while searching and further while staying in a PG will not only be an easy, effective, and time-efficient way but it'll also be substantial in the long run. There are very less such platforms in the market currently whereas customers and their hassle to find a suitable rental paying guest accommodation is growing every day.

Fig. Logo of the app Nestohh

Our project is based on developing a cross-platform mobile application called 'Nestohh' using Flutter/Google Firebase/RazorPay API technologies that will simplify PG-hunt and manage payments and services on a single app platform. The app will be available for android and iOS. For starters, we have listed PGs with prices and amenities in different areas and ensured that we carefully adapt the listing criteria because we all understand how important it is to feel safe and homely in a PG. Once a user checks in, she needs to sign up and log in. After login in, the user is shown a list of paying guest options with amenities and prices. Once a customer selects and finalizes a particular PG, Nestohh app will take care of their monthly payments, routine room services, and complaints like menu changes and requests. It will help to eliminate the various problems a new person faces in a city while finding a suitable PG because of lack of information and will help new PG owners to market their properties. We have supported the app with a good database, efficient algorithms, and information that will be updated in real-time using Google firebase ensuring there is no problem for either party and everything is managed effortlessly with just a few clicks on their mobile phones.

2. LITERATURE SURVEY

We found that currently there are few mobile applications and websites present for paying guest/rental listing. They are primarily for rental house management and use technologies like Andriod studio, full-stack, Django, etc. The problems in the present system are (i.) a customer can get only a little information like address and contact number through the existing few apps. (ii.) Due to a lack of proper information about amenities, the customer might be misguided. (iii.) Slow app response and (iv) No post-booking management and support like payment and raising requests for housekeeping.

There are hotel room booking and flat booking services available like OYO & NESTAWAY but there are not many reliable PG booking and management services.

During our research, we referred to papers, articles, and websites related to housing management and digital payment safety. The framework presented in [1], [2], and [3] gives us an understanding of how rental management websites work. Further [4] and [5] take the idea of rental management systems and implement them for paying guest management. [8] and [9] give a checklist of things users look for when they finalize a PG.

The UI design was inspired by a few existing booking websites ([11], [12]). [15] gives an overview of online payment safety.

3. PROPOSED SYSTEM

The proposed system, Nestohh is a cross-platform mobile application that lists and manages PGs and maintains a repository of all related information of users. The app allows one to easily access the relevant information (location, food, price, facility) and make necessary judgments regarding the PG's selection, and even securely pay after selecting the best PG of their choice.

For this project, we went through works and papers published on rental house management systems and found out that these kinds of platforms aren't explored well in Bangalore city. We surveyed students currently staying in pgs to find out common opinions and it was found that 73% of them agreed that finding a new PG being completely new in the city was confusing and tiring and further involved unnecessary wastage of money, sometimes brokers are also involved.

Most of the sample population (~200) agreed that finding a good PG, with a feedback system in place, proper management, and payment processes needed to be made better.

Keeping the response and problems faced by people staying at PGs in mind, we made requirement studies, built system designs, chose technology stacks, and finally proceeded to development and implementation. The water flow design model was adopted for building the app. System development shows us the path in which the proposed system is developed from the beginning to the testing and deployment.

A few of our questionnaire data is as below:

Q1. Did you have to shift to Bangalore from other cities/towns for college/Work?

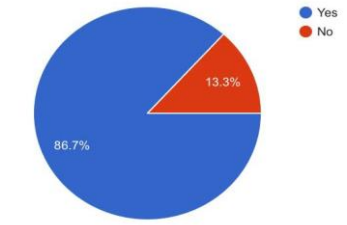


Fig. Pie chart 1

Q2. Finding a PG being completely new in the area was a confusing and tiring process:

4

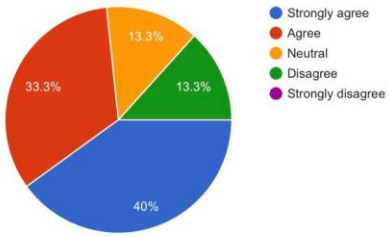


Fig. Pie chart 2

Q3. There's no feedback system to raise complaints:

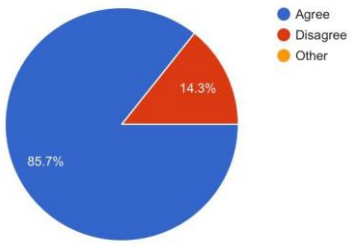


Fig. Pie chart 3

Q4. You had troubles while paying rent:

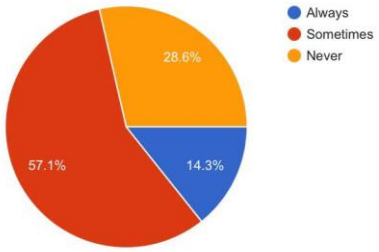


Fig. Pie chart 4

4. MODULES

(i). User Module

The users can be customers and PG owners.

For customers:

1. Registration/login
2. Check PG, amenities, prices
3. Book Room
4. Raise requests
5. Payment

For PG owners:

1. Registration/login
2. Add/Update amenities
3. Attend requests

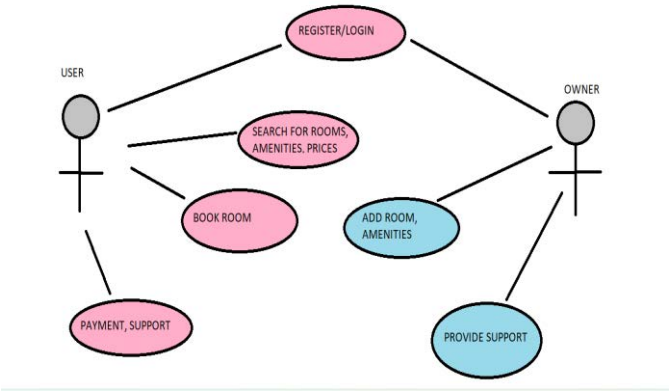


Fig. User Module

(ii)Admin Module

The admin verifies and confirms login credentials, manages wish list, and notifies owners when a request is generated by users.

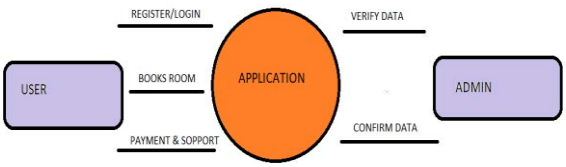


Fig. Admin Module

(iii) App Overview

The users and the PG owners can register and login into the application. The users have access to the list of PGs, amenities, cost, feedback, service requests, and payment management. The PG owners can add and modify amenities and respond to user requests. The admin verifies the registration credentials and provides a secure payment gateway.

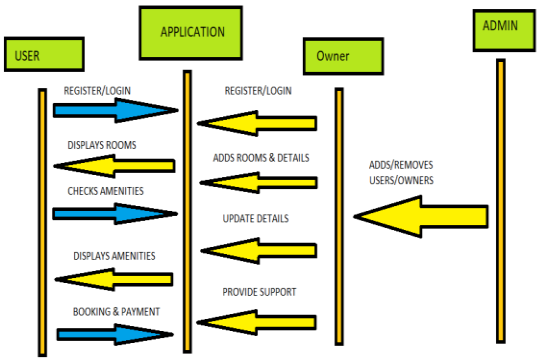


Fig. Different modules identified

5. OBJECTIVES

1. Making a cross-platform mobile application based on technologies like Flutter, Google firebase, and Razorpay
2. On the app, set up a sign-in page, list PGs, list their amenities, prices, etc. Set up admin management for PG owners and set up a payment gateway.

6. TECHNOLOGY AND MODEL USED

To achieve the mentioned objectives, the technology stacks used are as below:

1. Flutter

Firstly while choosing the technology, we wanted to choose such a technology in which we can build both IOS and Android apps. Since we didn't want to make it separately, we found only two technologies Flutter and reactive native although both technologies are used to build the hybrid app when it came to choosing the technology, we figured out that Flutter is easier and it was meeting our requirements, It is object-oriented and built on a programming language called Dart which is similar to Java and its open-source and has large community support.

2. Google Firebase

Coming to the data database for storage we are using the Google Firebase is flutter is built by Google and firebase is handled by google so both are compatible with each other in a very good way

3. Razorpay

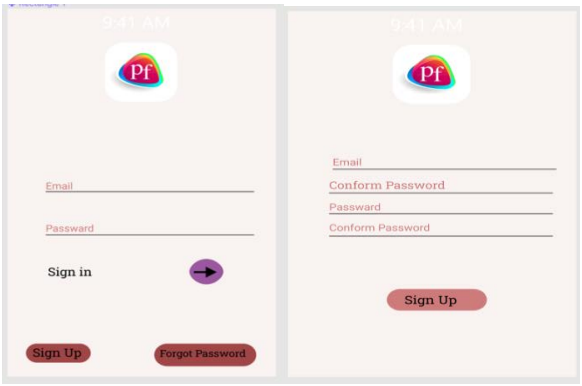
RazorPay, as we know, is one of the leading payment gateways and we can do credit card transactions, debit card transactions, and UPI Transactions so we have chosen it and for developers, it also provides a dummy payment gateway system.

7. RESULT AND ANALYSIS

People find it convenient to use apps these days for various purposes. Searching for hostels and PGs is an inevitable and tiring process when someone moves to a new place. There are not sufficient paying guest accommodation listing mobile apps in the current app market. Apps like Nestaway and Oyo proved to be socially very beneficial for people for finding apartments and hotels with the ease of a few clicks, a similar platform for PGs is likely to bridge the gap between finding an ideal PG and the efforts needed to select one physically.

We have tried to keep the UI/UX minimal and simple, so the user finds it convenient to register, log in, and use the app.

Registration/ login page with sign-in/log-in options



Home page

Amenities Page

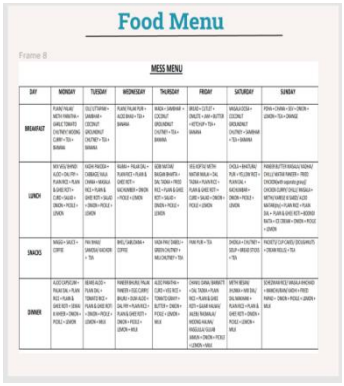
After clicking on the image of any PG, the user will be directed to the Amenities page.

Images

It includes actual images of bed, study table, bathrooms, mess, gym, etc.

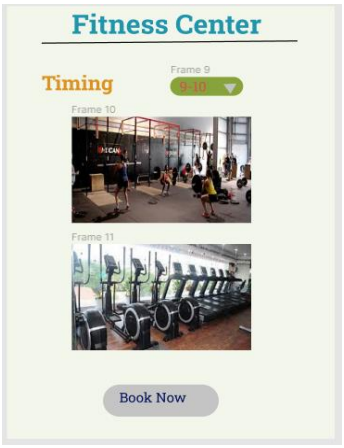
Food Menu

Weekly breakfast, lunch, dinner menu with timings.



Gym

Timings and images of gym equipment.

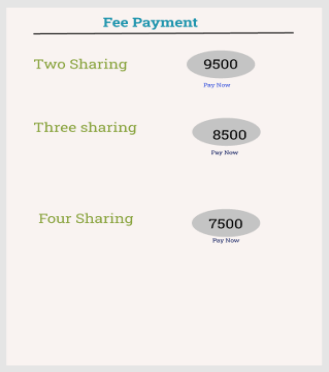


Housekeeping Request

A user will be able to enter his room number, select the housekeeping request they need, and pick a suitable time.

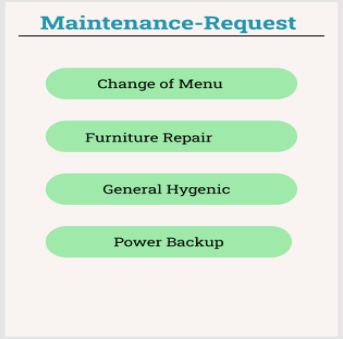
Fee Payment

Icons for payment for different kinds of shared accommodations with prices that will be redirected to razor-pay and other safe payment windows.



1. **Maintenance**

A page where users will be able to raise requests like change of bedsheet, repairs needed, or any other query/complaints.



Following all the above steps, we are ready with our product. We will test it among a smaller crowd and check if any fault is detected and finally the product will be released to app stores.

8. LIMITATION AND FUTURE WORK

We have incorporated many features into our app. In the future, we would want to add Google Maps' location API and implement it across cities. Advanced filters like budget, distance from a landmark, most booked, etc. can be added to make the app more reliable and helpful for the user.

9. CONCLUSION

The Nestohh app is developed to help students/ working professionals find affordable PGs according to their budgets in the cities they migrate to. This app also provides information about the amenities and is equipped with price comparing and payment features. With the diversification of educational institutes and office spaces across numerous cities, paying guest accommodation is booming exponentially. Hence this app will prove to be valuable as it swaps the traditional PG hunting method of visiting it physically for a much more effective and time-efficient gateway i.e., online and it'll also be substantial in the long run since there are a handful of such platforms currently available in the market.

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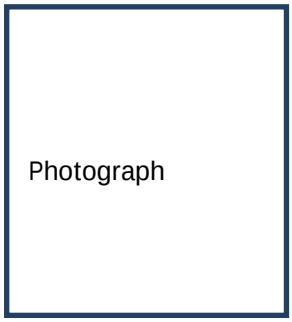
Biographies



Author Name received the bachelor's degree in computer engineering from Cankaya University in 2010, the master's degree in computer engineering from Gazi University in 2014, and the philosophy of doctorate degree in Electrical-Electronics & Computer Engineering from Duzce University in 2017, respectively. He is currently working as an Assistant Professor at the Department of Computer Engineering, Faculty of Engineering, Duzce University. His research areas include mobile security, deep learning, and social network analysis. He has been serving as a reviewer for many highly-respected journals.

EASY INTEREST LOAN APPLICATION

PalagiriSaiKalyan Reddy [1]

Pradeep RS [2]

Pavanajayvarma k [3]

Rakshith Nayak[4]

[5]Vani K

School of Computer Science and Engg

REVA University

Bangalore – 560064

vanikrishna.s@reva.edu.in.in

R18CS270@cit.reva.edu.in

R18CS291@cit.reva.edu.in

R18CS278@cit.reva.edu.in

R18CS250@cit.reva.edu.in

Abstract:

Easy Interest is an android application in finance sector. This application mainly develop for middle class people, vendors, and daily wages workers. Getting loan for middle class people is not easy, also they do not need lot of money. They just need capital for buying stock and etc. So, we are making an android application for the people who need less capital. The people who need money they can take from Easy Interest. They need to pay the money which they take in 100 days. At the time of loan sanction we also add interest for 100 days. The total money is divided by 100 i.e, if he take 10000 and interest is 1000, then total is 11000. We divide 11000 by 100 then daily he should pay 110. We are using flutter and Razorpay payment gate way to develop this application.

I.INTRODUCTION

Getting a loan for middle class people, daily wage workers, vendors are not easy. To help them we are planning develop an android application. In application people who need money for capital or any need they can take from East Interest. The name suggests it's a easy way to pay interest. First of customer need to create a account in Easy Interest by submitting documents. After verification is done he can access the application. Customer can take money by telling his needs. At the time of sanction we also add interest for 100 days because we give 100 days' time to pay the money back. We will be using Razorpay payment gateway method for the transactions in Easy Interest. Paying money daily is better than paying one in a month. Because they can't feel burden. [8] The main goal of our Easy Interest is making people pay the interest in easy and burden less.

II.LITERATURE SURVEY

In this project we are using flutter [1].Flutter transforms the app development process. Build, test, and deploy beautiful mobile, web, desktop, and embedded apps from a single codebase. In Flutter, every application is written with the help of Dart [2]. Dart has a Java-like syntax , it is developed by goggleand it's a client optimized so developer can develop app easily and fast by client needs[3].There are many payment gateways available in the market, but we will use a very popular payment gateway known as Razorpay. Razorpay Android Standard SDK lets you easily integrate the Razorpay Payment Gateway with your Android application [4] [9].

III.SYSTEM MODULE

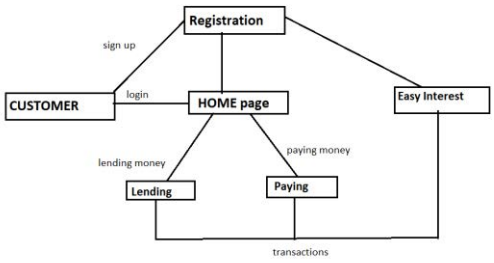


Fig 1. Various modules of the system

1) Registration: The registration means creating account in the application using Email. After doing registration we can login the application.
2) Loan application: A loan application is used by borrowers to apply for a loan. Through the loan Applications, borrowers can apply loan without stepping in to the bank. By loan application there is no need of paper work. With the help of loan applications there no need of standing line banks**.**
3) Loan sanction: After borrower applying the loan amount, the people check is PAN card score and if the score is good barrower will get their money sanction. If the score is not he will not get their money sanctioned.
4) Payment: The payment is done through via Razor pay payment gate way method. After application successfully verified, the money transfer to their account. The customer also pay their due through Razor pay payment gateway.

3.1 Objectives:

1. Creation of sign up/login page using flutter.
2. KYC verification done by using personal information of user.
3. Perform money transaction using Razor pay payment gateway method**.**

IV.METHODOLOGY

1)We made login and sign up page using dart packages in flutter.
2)we use razor payment method for transaction.

How do easy interestloan application works?

.)Register a new account or log in with their credentials.
.) Select the sum they need to loan or the money they are ready to invest.
.) Select the interest rate suitable for them.
.) Connect their bank accounts to their lending app accounts

V.RESULTS

In this section user can create account by giving his se-mail id, password and create your account. After creating your account user can login through his account by using their email and password as show in fig.2. After login through his account, there are two sections one is apply loan second is pay loan due. In first section user can apply loan ranging from Re 10000 to Re.100000.

In second section if user wants to pay loan click on pay loan due as shown in fig 3. In this section if user wants loan submit your bank details and user will get loan amount through his bank as shown in fig 4. This picture shows Interest plan how much user have to pay interest. If user want to pay interest on day basis user should click on day wise plan.If user wants to pay interest on monthly basis user can click on monthly plan.

If user wants to pay interest on year basis user can click on year plan as shown in fig 5. This app will calculate the amount of interest that the user would have to pay on the loan amount for a specific period of time as shown in fig 6.

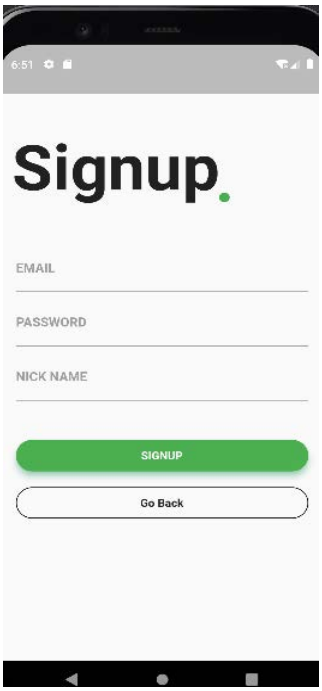


Fig 2. Login/Signup page.

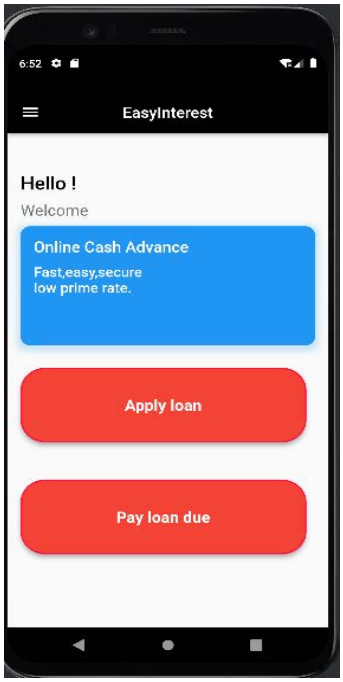


Fig 3. Welcome page

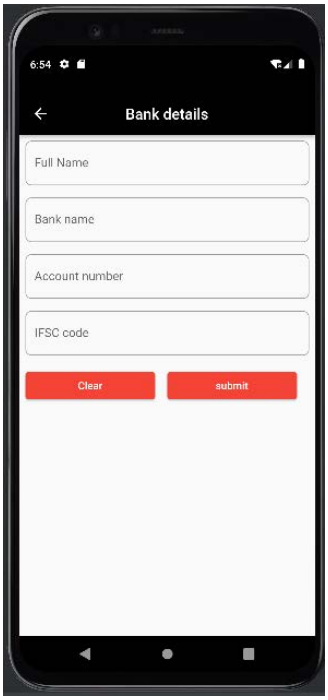


Fig 4. Bank Details

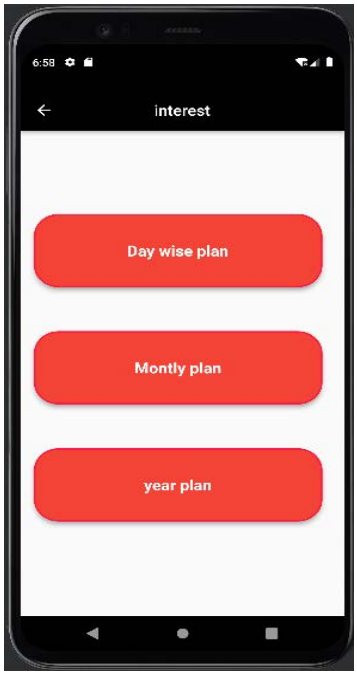


Fig 5. Plan

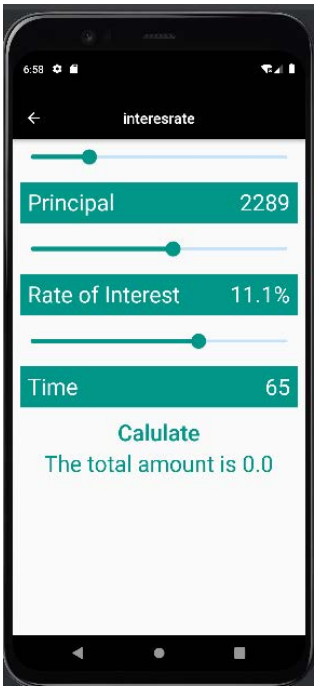


Fig 6. Interest rate

VI.CONCLUSION

The Easy interest is helpful for middle class people who need money for capital or needs. The main goal of easy interest is getting loans easy for middle class people and also paying the interest in the simple and burden less.
In future we may add that customer can save their money or invest.

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Sentiment Analysis of Customer Text Content in Product Reviews Using the LDA Method

Kishorchand Hirasingh Rawat[1], Dr. K.Amuthabala[2], Dr. Sasidhar Babu Suvanam[3], Prof. Keerthana P[4]

School of Computer Science and Engineering, REVA University, Bengaluru, India

[1]*kishore.rawat@gmail.com*

[2]*amuthabala.p@reva.edu.in*

[3]*sasidharbabu.suvanam@reva.edu.in*

[4]*keerthana.P@reva.edu.in*

Abstract

In the current world of ubiquitous usage of Internet for most of our daily activities, purchasing of products and services from popular e-commerce websites is a well-known fact. Most of the consumers prefer to make an informed decision while making this purchase, for which they refer to the previous customer's reviews and feedback on the various features of the products or services offered. Hence it is imperative for every e-commerce organization to analyze this feedback to extract the appropriate sentiment of the customers, which then drives their recommendation systems as well as help in improving quality of the products and services. As customer reviews may contain user's mixed feedback on different features of the product, extracting sentiments becomes a challenging task. In this paper we propose aspect-oriented sentiment analysis using topic modeling algorithm called Latent Dirichlet Allocation (LDA). We extract the topic words from the customer reviews and map them onto various aspects or features of the product to perform aspect-specific sentiment analysis. The proposed approach combines word level and syntactic-relation level language analysis for an enhanced level of sentiment analysis. The results of this combined approach are much improved compared to conventional methods of sentiment analysis.

Keywords: sentiment analysis, topic modeling, Latent Dirichlet Allocation, LDA, review aspects, aspect-oriented sentiment analysis

1. INTRODUCTION

The usage of online e-commerce platforms, social media networks, online forums and blogs has increased tremendously in recent years, with increasing need for analysis of the feedback and reviews of the users of these platforms. Analysing these reviews and feedbacks in terms of positive or negative sentiments is critical to analyse the behaviour of the users, where these reviews express the customer's opinion about buying a certain product, services offered in a hotel, watching a movie etc. Sentiment analysis of these reviews becomes a very valuable resource for the business as well as future customers of the product or service.

Sentiment analysis consists of extracting the feelings and opinions of people from the review text, which is a huge challenge due to the scale and distinct structure of the language constructs. It involves usage of natural language processing, various statistical methods and optimized machine learning algorithms to extract the proper sentiments from the text corpus. There are various methods of sentiment analysis which work at document-level and sentence-level of the corpus. In this article, we propose to extract relevant aspects from the review

comments using topic modeling with LDA and then doing sentiment analysis on those topics using syntactic evaluation and polarity detection.

Aspects refer to the main topics or features of a product or service such as “engine” for a car review, “lens” for a camera, “food” for a restaurant and so on. Aspect based sentiment analysis provides much finer-grained opinion of users than the conventional coarse-grained document or sentence level analysis. The task complexity increases as one single user review can have multiple sentiments about each individual feature of the product, which requires the analysis of part-of-speech as well as any inherent syntactical meanings which signify the correct user sentiment. There are some known drawbacks of these methods like extracting large number of aspects some of which could be irrelevant to the domain of study. Also, extracting higher frequency aspects lose the infrequent aspects although some of them could be important for the analysis.

The following part of the paper is organized as follows: Section 2 provides details on the related work in this area, Section 3 illustrates the workings of the Latent Dirichlet Allocation (LDA) algorithm, Section 4 describes the approach and methodology of this paper, Section 5 illustrates the results and evaluation of the same. We conclude with Section 6 highlighting the important aspects of this paper as well as the interesting future work possible in this area.

2. RELATED WORK

In this section, we review some prominent work done on sentiment analysis specifically using the aspect-based topic modeling approach that is relevant to the study of this paper. The aspect-based sentiment analysis was first proposed by Hu and Liu [1] which gained wider popularity for further research in this domain. The proposal in [2] uses semi-supervised approach to use both labeled and unlabled data for the topic extraction process. The most popular method for extracting the aspects is the frequency-based method as illustrated in [3], which is used by many researchers despite being relatively simpler than other complex methods. This method works by extracting the high frequency words, most commonly which are nouns and noun phrases, and designate these as the candidate topics. After the aspect is extracted, the nearest adjective of this aspect is selected as its sentiment word. The work of Mubarak et al. [4] is among the recent works which uses this frequency-based approach. Akthar et al. [5] proposed the two-step approach for aspect-oriented sentiment analysis, viz. first extracting the aspect term and then in doing the sentiment classification in the second step. The rule-based method or syntactic relation-based method uses language specific syntactic structure and relations of words to identify the sentiment, which is the Double Propagation approach used in Qiu et al. [6].

3. LATENT DIRICHLET ALLOCATION (LDA)

LDA is a probabilistic generative model proposed by David Blei et al. [7], and it the most popular topic modeling algorithm used to extract topics from a large text corpus. LDA takes into consideration that each topic consists of a mixed set of words and each document is a mixture of a set of topic probabilities.

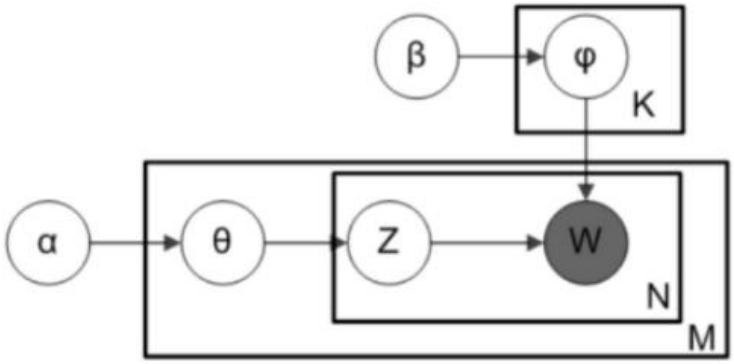

Fig.1: LDA Topic Modeling

We can understand the LDA generative process with the help of the different parameters, which are as follows,

- M – number of documents
- N – number of words in each document
- K – number of topics we want to extract from the corpus
- α – Dirichlet prior concentration parameter which specifies the document-topic density, higher alpha value would mean a greater number of topics per document
- β – similar to α for per-topic word distribution, higher beta would mean topics contain a large number of words
- z, w – multinomial distributions
- ϕ(k) – word distribution for topic k
- θ(i) – topic distribution for document i

4. METHODOLOGY

Customer review analysis allows companies to understand customers' needs and preferences and improve their services or create new products based accordingly. This can help businesses with better customer retention and acquisition, and hence revenue growth. Customer reviews are often multidimensional. For example, a restaurant customer could have a positive view on waiters and servers but might be less satisfied with the menu and the variety of choices offered by the restaurant. Aspect-based sentiment analysis allows to separately analyze each category, which corresponds to a specific component of the services/products. This method is also helpful in rapid sorting of customer complaints and assigning customer support tasks, which means effective customer support. The review analysis pipeline for this project included the following steps:

1. Extracting topics/aspects of a review
2. Sentiment analysis for each aspect
3. Extracting the subject of the review and its descriptors

Dataset: The dataset comes from restaurant visitors' reviews and included 3149 and 400 labelled reviews in the train set and test sets, respectively. Each review is labeled from a total of 8 aspects: 'food', 'menu', 'service', 'place', 'price', 'miscellaneous', 'staff', 'ambience'.

Analysis

1. Aspect identification:

There are two options for identifying aspects in a review:

1) Supervised learning using labelled dataset, and

2) Unsupervised topic modelling.

The first approach can be implemented using a multi-label classification algorithm, since a review can contain multiple aspects.

The second approach can be implemented using any of the typical topic modelling methods, such as Latent Dirichlet Allocation, non-negative matrix factorization, etc.

The extracted topics can then be cross-referenced with aspects, for example using the cross-correlations between topics and aspects, to identify the aspects associated with them. For this project, a voting ensemble was used to improve the prediction power.

The ensemble of the following 4 models was used to identify the main topic(s) for each review:

- multi-label classification (supervised)
- Latent Dirichlet Allocation
- non-negative matrix factorization with Frobenius norm
- non-negative matrix factorization with Kullback-Leibler divergence

1.1. Supervised aspect detection using multi-label classification: Classifier chain algorithm, with logistic regression as the base model, was trained on the labelled data (train set). The model achieved average scores of 0.86, 0.79, 0.82 for precision, recall, and f1-score, respectively, on the test set.

1.2. Topic modeling: For topic modelling, two methods were examined: Latent Dirichlet Allocation (LDA), and non-negative matrix factorization (NMF). LDA is a Bayesian method which finds topic using expectation maximization, where each topic can be represented by a group of words. NMF, on the other hand, is dimensionality reduction methods which decomposes the original the input data and transforms it obtain a smaller matrix, with fewer number of features.

For topic modelling, this method is used to find a few topics from the original feature vector (vectorized text). The decomposed matrices can be used to reconstruct the original matrix and the loss is calculated based on the reconstruction error and can be evaluated using Frobenius norm or Kullback-Leibler divergence.

2. Sentiment analysis: Sentiment analysis was performed using NLTK library (VADER) to estimate the positive, negative, or neutral sentiment associated with a review.

Extracting review subject and descriptors: This final step of the pipeline provides more contexts about the review through information extraction. To understand the review more specifically, it's useful to extract the subject of the review and its descriptors.

5 Results and Evaluation

The topic modeling results of the proposed approach is as show in Fig 2 below,

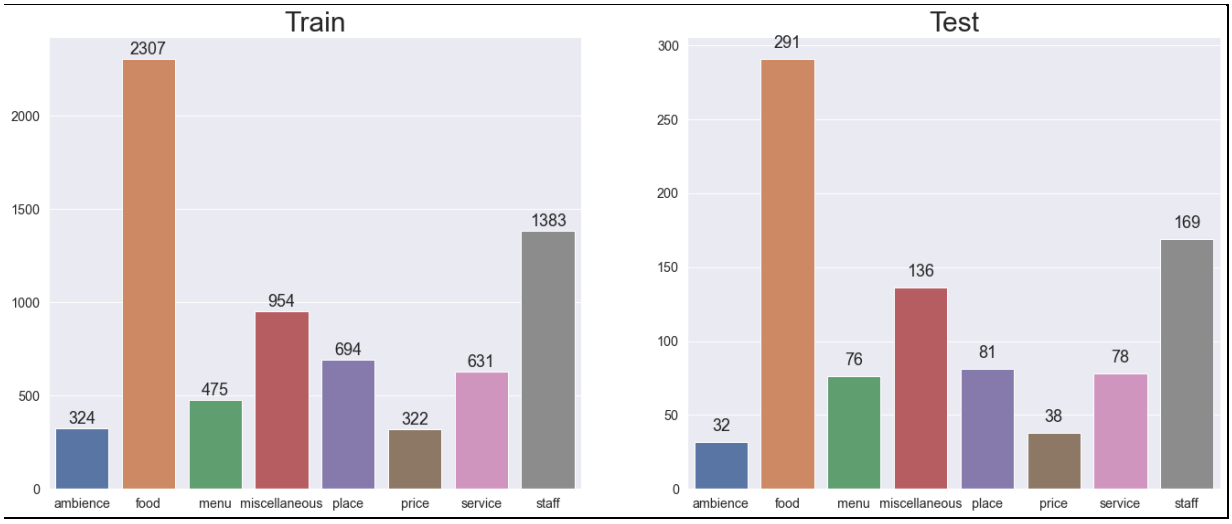

Fig.2: Topic Modeling of the Restaurant Reviews Dataset

The extraction of various topics from the review dataset is depicted using the word cloud image in Fig. 3,

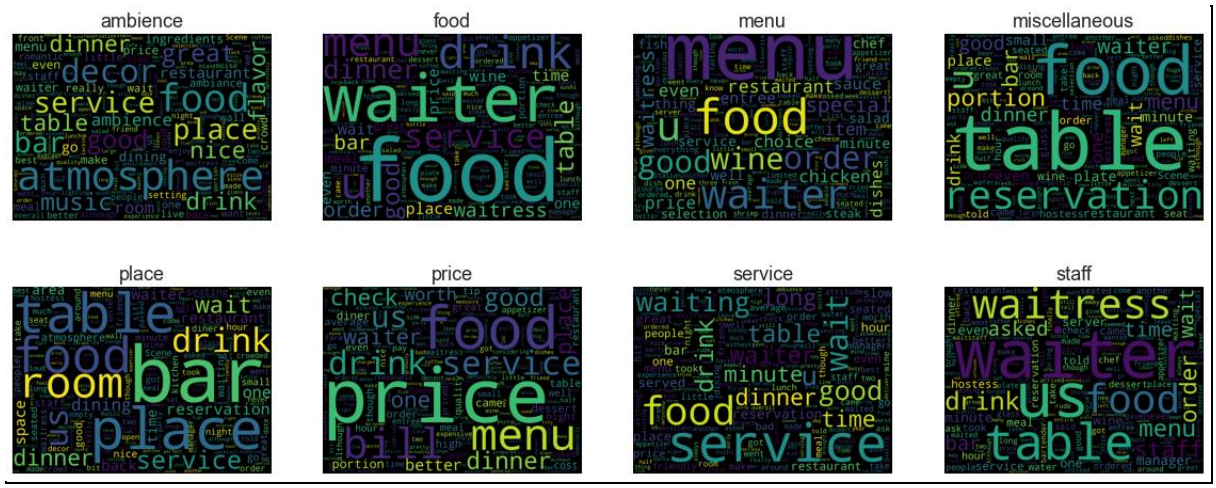

Fig. 3: Word Cloud for the Topic Extraction from Restaurant Reviews Dataset

The results in terms of precision, recall and f-measure show that our proposed method performs much better than the conventional baseline methods.

$Accuracy = (TP + TN)/(TP + TN + FP + FN)$

$Precision = TP/(TP + FP)$

$Recall = TP/(TP + FN)$

5. CONCLUSION AND FUTURE WORK

This paper has proposed an efficient approach for sentiment analysis of user reviews, showing the advantages of a fine-grained review analysis. This approach has used the LDA algorithm for topic modeling for the review corpus which extracts the most important “topics” from the dataset, and then maps these topics to the various aspects of the service. Then we perform sentiment analysis using various NLP and machine learning techniques. For the supervised aspects of the task we have to manually map the reviews to certain topics, which can be improved by automation in the future. The scope of scaling the algorithm to bigger size of corpus with improved performance using multi-core algorithms also could be a potential future work.

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Age and Gender Prediction using Deep Learning Algorithms

[1]Adnan Azam, [2]Avi Coomar, [3]Akash Bharadwaj, [4]Mahesh Kumar M R

[1, 2, 3] Student, School of CSE, REVA University, Bengaluru, India
[4]Assistant Professor, School of CSE, REVA University, Bengaluru, India
[1] adnanazam26@gmail.com, [2]r18cs506@cit.reva.edu.in , [3]akash267000@gmail.com, [4] maheshkumar.mr@reva.edu.in

Abstract

Deep Learning has gained a lot of popularity recently. One sort of Deep Learning Neural Network is the Convolution Neural Network algorithm (CNN). CNN is a strong neural network that is widely used in machine vision, image analysis and categorization, and identification, among other applications. Facial analytics from photos as variety of issues like enhanced content suggestion systems, threat monitoring using cameras, consumer specific marketing, and other disciplines. To this end, we propose an application which is capable of making predictions of age and gender on a given photograph. We train our model to the most recent Adience benchmark for predicting age and gender. The network trained on OUI-Adience collection showed some promising results, performing with the test accuracy of 95% and 80% for age and gender estimation respectively.

Keywords **-** Image Classification, CNN, Deep Learning, Image processing, Age, Gender, Prediction, EfficientNet, Adience benchmark

1. INTRODUCTION

Facial analysis has gained a lot of attention in recent years and its study has rapidly grown by means of not only the most proficient engineers, but neuroscientists as well, because it has various possible uses in computer vision communication and autonomous access control systems. Face detection is an initial stage in digital face recognition. Face identification, on the other hand, isn't always accurate since there are several variations of photographs, such as stance variation (frontal, non-frontal), obstruction, photo alignment, lighting conditions, and facial expression [1].

1.1. Picture Processing

Picture processing is the process of improving image photos collected from cameras, airplanes, satellites, and photographs taken in daily life. Many approaches and computations are used in image processing based on analysis. Virtual pictures must be carefully developed and analysed.

Picture processing consists of two main processes that are bridged by simple steps. Photo enhancement refers to the modification of a photograph with the goal of

producing higher-quality images, which may be accomplished via the use of various apps. The other approach is the most often used strategy for extracting information from a photograph. Segmentation is the process of dividing pictures into distinct components [2].

The challenge of facial recognition has been extensively researched. “Support vector machines” [17][22] Neural networks, template matching, color mapping, maximal rejection classification, and model-based detection have all been utilized. However, designing algorithms that operate for all lighting conditions, facial tones, shapes and sizes, and image backdrops are significantly more challenging. As a consequence, facial recognition remains an art as much as a science [3] [21].

The development of thoughts aids in the establishment of particular limits. Age assessment is still a multi-class challenge in which the years are categorized. People of various ages have different facial characteristics, making it challenging to combine the photographs.

Approaches for determining the age and sex of various faces are used in a variety of ways. The CNN extracts the features from the neural network. Each image gets categorized into an age group based on the provided models. The features are further analyzed and eliminated from the training modules.

2. RELATED WORK

Many researchers have suggested different deep learning techniques to classify age and gender out of an image.

A. Age / Gender Classification

In recent days, interest in the issue of extracting age-related features from face photographs, and various techniques have been proposed. A thorough review of such methodologies can be read in [4] and, more lately, in [5]. Although we are focusing on classifying the age “group” and not the exact age.

The first approaches for estimating age focused on measuring proportions between different facial features [6]. When facial features (example nose, eyes, ears, chin, mouth, etc.) have been located and their measurements of sizes and distances, between them, proportions are determined and used to classify the face into different categories of age groups using handcrafted regulations. Recently, [7] used something similar to estimate age in subjects under the age of 18. Because they necessarily require precise facial feature localization, which is one difficult problem to solve in itself as they are ill-suited for the type of images found on social media platforms.

In the first approaches for “Gender classification” [8] employed a neural network which was trained on a limited number of nearly frontal face images. They had used a machine learning algorithm which is the SVM Classifiers [9]. The Webers Local Texture Descriptor [10] was recently used for gender classification, with performance being almost perfect by the FERET bench-mark [11].

[18] used multiple convolutional neural networks for detection and alignment of facial image. Then used voting system to consolidate the predictions from various networks. Researchers in [19] used two level CNN architecture for extraction and classification out of an image. Also, they have used image processing algorithm to capture unfiltered faces before passing into the CNN model.

We use the “Adience” dataset, which has complex pictures than those provided by LFW, for age prediction., and report the performance using a better method built to utilize data from huge sample training datasets in a much better way.

3. METHODOLOGY

A. Age / Gender classification using Convolutional Neural Network

Procuring a humongous, labelled image training data set for age / gender classification from social image repositories most often presupposes either access to confidential information on the participants appearing in the images (their date of birth, gender, etc), is almost always strictly limited, or physically categorizing the photos, which is laborious and time-consuming. That's why when juxtaposed to an even larger picture categorization sets of data, dataset for predicting age / gender from true social images are rather minimal (e.g., the “ImageNet” dataset [12]). Overfitting is a major complaint when ml techniques have been used on such tiny picture resources. This challenge is exacerbated by the enormous number of model parameters in CNNs. In any of these contexts, prudence is required to prevent generalization error [13].

B. EfficientNetV2

For high-quality, speedy image classification, EfficientNets has been a benchmark. They were introduced roughly three years ago and quickly gained popularity because of the way they scaled, which provided them to learn comparatively quicker than previous networks. From the point of learning duration, EfficientNetV2 is a marked improvement over earlier versions, for a little advantage in accuracy. It adopts the paradigm of progressive learning, which entails that the imagery sizes initially minimal and gradually rise in size as the training goes ahead. The justification which is provided is that earlier versions' training capacity bogs down as picture resolution goes up.

EfficientNets employ a "depthwise convolution layer," has FLOP and lower complexity than most of the other conv layers. To solve the problem, a new layer dubbed "Fused-MB Conv layer" was proposed in a study entitled "MobileDets: Searching for Object Detection Architectures for Mobile Accelerators." In this respect, EfficientNetV2 incorporates this additional layer. Since it has a larger number of parameters, researchers can't realistically exchange all the old MB Conv layers with the fused ones.

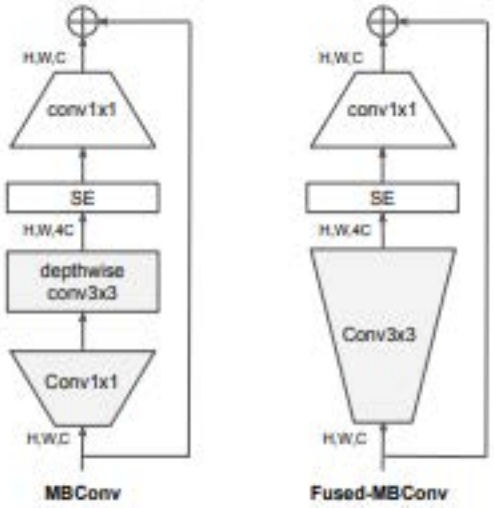

Figure 1. **Structure of MBConv and Fused-MBConv**

Using a simple compound scaling strategy, EfficientNet evenly scales up all phases. According to the authors of EfficientNetV2, this is redundant, since expanding is not intended for all of these initiatives to change performance. As a consequence, they have been using a different amplification mechanism to systematically add more layers in successive phases. They also include a sizing restriction to cap peak picture dimensions, as EfficientNets have a tendency to strongly scale up graphics, which is responsible for the characteristic concerns.

4. EXPERIMENTS

A. The Adience benchmark

Adience benchmark, tailored for age and gender categorization, is what we have used as an evaluation metrics for our CNN design [14]. Because the pictures in the Adience set were uploaded authentic without any extra filter added to it, (e.g., photographs from the LFW series [15]) or social websites (the company snapshots set [16]), the viewing contexts in these selfies are moderately free and open, indicating the humongous real-world conditions of photos consisting of face.

In 5 levels, the file comprises around 26 thousand photos of 2,284 persons. To underscore the clear edge related to the core network rather than improved preparation, these photos are presented instead of newer alignment algorithms. We applied the same network design for all the benchmark's test folds and, in reality, for both gender and age class roles. This was to make sure our outcomes are consistent and more precise, as well as to exhibit the universality of the network model provided here; after comparing, we found that it worked properly in many different situations.

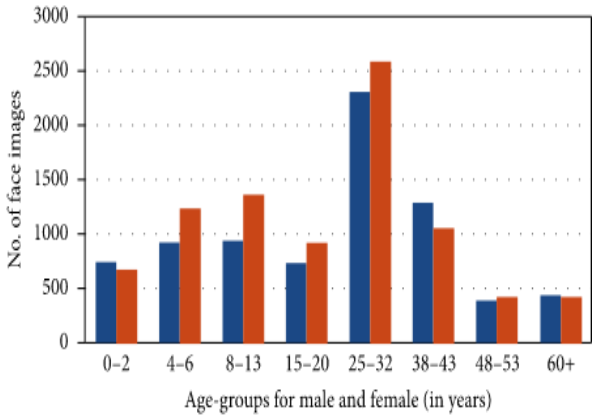

Figure 2 Number of images age wise

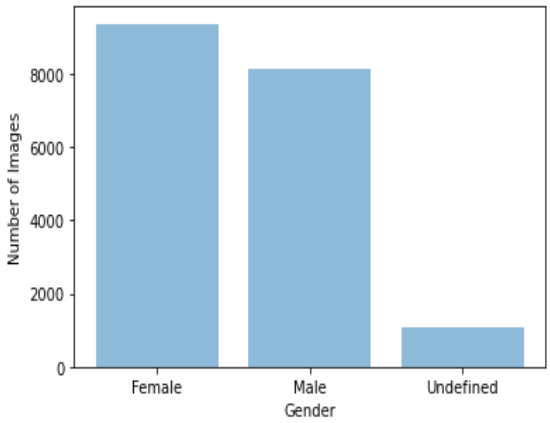

Figure 3 Gender wise number of images

5. IMPLEMENTATION

The python libraries such as Keras, TensorFlow, Matplotlib, pandas, and NumPy were utilized to build the system. Keras has certain built-in features, including activation functions, optimizers, layers, and so forth. The system backend is based on Tensorflow.

Name	Experimental tool
Hardware	Python 3 Google Compute Engine backend with Tesla P80 GPU
Software	Google Colab (Python 3.7)
Programming Language	Python
Method implementation	Keras 2.2.4 & TensorFlow 2.4.0

Table 1 Tools used for system implementation.

As we had mentioned above, the extraction of the features was done using the EfficientNet model. The tools utilized in this system implementation for experimentation are listed in the table above which shows the hardware, software, and the backend implementation. After connecting the model's last maximum pooling layer to a global average pooling, we then trained the dense layers for our dataset. On the last layer we used activation functions such as sigmoid and softmax for gender and age respectively, for converting the output layer to a vector that represents the probability distribution of a list of possibilities for 2 categories for age estimation and 8 categories for gender estimation respectively. While training, we used 13961 images in a batch size of 32, which went on for 10 epochs, an "Adam" optimizer, binary-cross-entropy along with sparse categorical cross entropy loss functions to train the CNN. Upon evaluating the performance of our custom CNN model, we then tested the efficient v2 model on 3490 test images whose results are reflected in the result section.

6. RESULT

With custom CNN sequential model using layers which are: Conv2D, MaxPoolingLayer, LayerNormalisation, Flatten Layer, and Dense Layer, accuracy obtained was:

Category	Accuracy
Gender Prediction	≈55%
Age Prediction	≈30%

Table 2.1 Accuracy with Custom CNN sequential model

With Transfer Learning using feature vectors of images with, EfficientNet V2 model, which was trained on ImageNet21k and fine-tuned on our dataset, accuracy obtained was:

Category	Accuracy
Gender Prediction (Fine-tuned)	≈95%
Age Prediction (Fine-tuned)	≈80%

Table 2.2.Accuracy with Transfer Learning

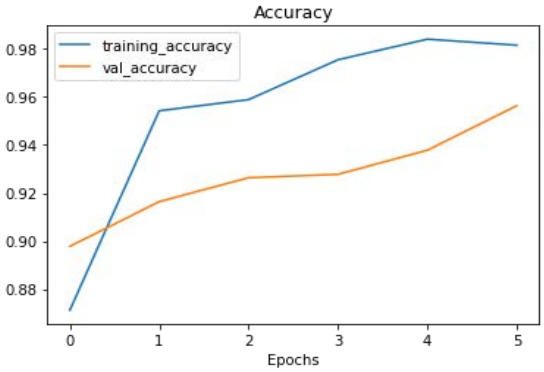

Figure 3.2. **Epoch versus Accuracy of Gender Model**

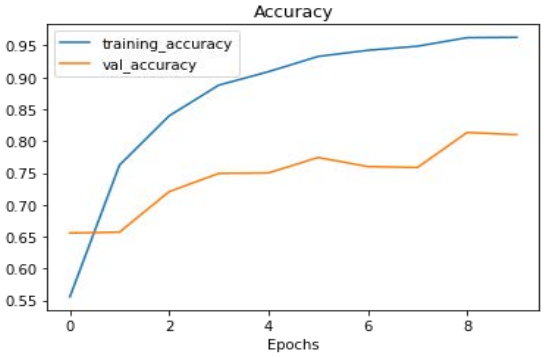

Figure 3.3 Epochs versus Accuracy of Age Model

7. CONCLUSION

The deep-CNN model we propose is derived from the base EfficientNetV2 trained on ImageNet21k, which we fine-tune with our problem-specific feature vectors on the OIU-Adience benchmark. Our dataset has enabled us to train our model on unfiltered real world images, giving it a chance to be leveraged in real world applications such as

security and targeted advertisements.

We found how deep learning showed some promising results in image related problems, specially how our CNN model outdid some recent works. In the future, we aim to enhance our to provide even better accuracy and explore how it can be used in real-time applications.

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A Voice Assistant for Shopping Malls to Find Product Location Using Natural Language Processing.

Zakiya Shabnam H R
Computer Science And Engineering
REVA University
Bangalore, Karnataka, India

zakiyahussain11@gmail.com

Vishrutha J
Computer Science And Engineering
REVA University
Bangalore, Karnataka, India
vishruthaj2000@gmail.com

Dr NP Nethravathi
Computer Science And Engineering
REVA University
Banglore, Karnataka, India
nethravathi.np@reva.edu.in

Zeenat Kausar
Computer Science And Engineering
REVA University
Banglore, Karnataka, India
zeenatkausar298@gmail.com

Yeshaswini C
Computer Science And Engineering
REVA University Banglore, Karnataka, India yesh690cdyhp@gmail.com

I. ABSTRACT

Traditionally, people go around and search the whole mart/shopping mall for a single product, or ask around the staff who are busy maintaining the place. As in today's busy world where people do not have time to eat a meal peacefully. Most of the times they find the product on their own or with the help of the staff, but sometimes fail to find it even with the help. Which results in the wastage of ones precious time and energy looking for it.

So in order to overcome this problem we have come up with an idea of creating an app which would assist the customers easily in marts with the usage of NLP and AI. When a person enters the name of grocery in the application's search bar they will be assisted by the application by giving the location of the product that he/she is looking for, the location will be given in the form of the floor number followed with the column number, row number, shelf number of the product.

Ultimately this reduces one's time, helps them find the product easily and gives a blissful shopping experience.

Keywords-: NPL (Natural Language processing), AI (Artificial Intelligence), Application, Search bar.

II. INTRODUCTION

Shopping is seen as a source of diversion or relaxation to many people from this hectic life, but if that time becomes more stressful when one can't find the product they want. But in some cases when there is an urgency/need of a product and searching for it makes the situation worse. This can be partially solved, by asking for help from the staff. But it is not always helpful as (partially because):

1. They are not always available to help as they may be working on something.
2. They themselves will not know the location of the product.

3. They may provide the wrong information and may end up wasting out time way more rather than reducing it.

4. It is not pretty good to ask the staff for help very frequently too.

The solution to the above scenario is simple, A Voice Assistant, which will communicate and answers us with the location of the Products.

A Voice Assistant can make our shopping spree blissful, one can easily have conservation with voice assistant just like they do with humans using technology like NLP and AI as a main concept. This also helps visually challenged people by giving them the location via audio, which includes floor number, column number, row number and stack/rack number. All a person has to do are the below two steps:

1. Go to the search bar of the application &

2. Search for the product by speaking/typing the name of the product needed.

Once the user gives the input the application starts its process of searching the product and gives the location respectively and in any case if the product is not present or not found it replies as "Not Found", so that the user can stop looking for it and move on to the next search. The advantage of this application is that it saves half of the time we spend in Shopping and making Shopping Smarter. [14]

The motivation to come up with such an idea is by experiencing/seeing front hand of people wasting their time in shopping places by searching for what they want rather than just buying those. It also helps the illiterates as it can just take in the audio of our speaking and give out the location as it has the option of text search and voice search, with output via audio out loud or text on screen. Now at times like this where the whole world is constantly under fear of getting the "Novel Corona Virus" also know by different names like "Corona", "Covid-19". It reduces human interaction as it makes one independent, there will be no more asking for help from the staff and reduce the chances of getting the virus. It also helps those who are not confident/comfortable with making human interactions [Introverts] to help themselves using this.

III. RELATED WORK

[6] A good soluction is given by Mobile Assistive Technologies(MAT) to help visually impared people to help and make their everyday life task easier by Mostafa Elgendy and Cecilia Sik Lanyi [2017] "Third eye: A shopping assistant for the visually impaired". Where in they use Smartphones with assistive technology in it to help them navigate through shopping.

[13] Daniel Hüsson and Alexander Holland implemented intelligent personal assistant (IPA)[2019]. This IPA is able to listen to voice commands, to interact by opening a report and giving a brief summary via speech-to-text to the user and explaining the most important information in the relevant context of the displayed KPIs.

[10] "Artificial Intelligence Based Person Identification Virtual Assistant" The framework enables justapproved users to access voice commands. By this we can getprotection and security for virtual assistant (VA). Users can asktheir help addresses like time, date and climate and find solution to the inquiries by P.Pradeep,P.Balaji,S.Bhanumathi.

[1] "AI based voice assistant" by S Subhash is a very useful paper since it purely concentrates on AI based voice assistant for large scale the difference between Subhash and our paper is that we have implement it for shopping mart while there is for larger database this paper makes us understand the relation and connect to database and voice assisstant.

[2] "An Interactive Voice Assistant System for Guiding the Tourists in Historical places ", by R. Keerthana and T. A. Kumar helps us find the direction to destination by using Goolge Maps API, which indeed gives a methodology for guide our customer to the required product.

[5] Hage and Ramsey paper on " *Voice-enabled interactive e-commerce*. University of Ottawa" is very effective for since we deal with the better user experience and this paer of Hage talks about how AI plays a important role in education and e-commerce for better user experience.

[7] Bhandari and Leena "SmartCart: Mall Assistant." This paper is very similar to what our paper deals with but the main differenece is that this SmartMart needs wifi connection to work and interact with customer.

IV. PROBLEM STATEMENT

The fundamental issue which people are facing regarding shopping in marts or malls, is finding the location of products without wasting any time.Even though online shopping is widely used these days there are many who prefer offline shopping, so that they are confident about the product and if they match their liking. We have the following issues:

Firstly, most of the people waste a lot of time on searching/finding where their product is instead of actually buying the product.

Second, visually impaired people find it difficult to do offline shopping and is a bigger issue.

Third, some people feel uncomfortable/diffident to ask for help from the staff and thereby find it difficult to locate products, resulting in a stressful shopping.

V. OBJECTIVES

The Project Objectives are as follows:

- To reduce the searching time for a product.
- To reduce the search complexity of a product.
- To make shopping easier.
- To eliminate the concept of seeking help from the staff.
- To make the user feel comfortable and independent.
- To help the visually challenged.

VI. MODULES IDENTIFIED

Our project consists of three major modules:

1. Speech-Recognition: This is a AI package which allows computer to understand human language and its main functionality is, to convert speech to text. This paper makes use of this package to take the input from the customers as the query.

2. date-time: This library is used to identify the current time of the system, Therefore in this paper its used to greet the customer based on the system timing like "GOOD MORNING ", "GOOD AFTERNOON " etc.

3. pyttsx3: This is a python package which is a third party library used in this paper for converting text to speech inorder to interact with customer by reading out the required query result.

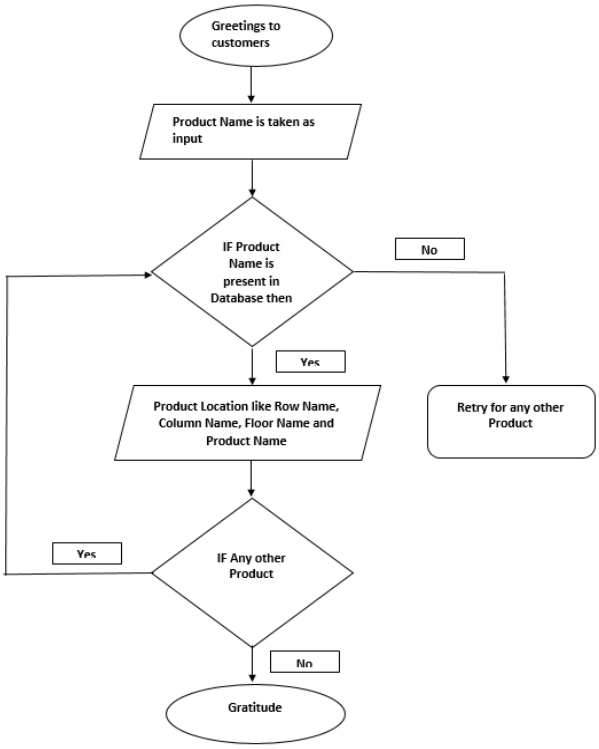
VII. SYSTEM REQUIREMENTS

SOFTWARE REQUIREMENTS:

•Pycharm IDE - software development tool used to create the AI based application.

•Google firebase – the Database used to store the information about the store.

VIII. WORK FLOW



IX. METHODOLOGY

Step 1: When one walks into the mart/mall they should have the respective application in their smart phones.

Step 2: After successful installation it is all ready to use.

Step 3: The user should give input i.e., the name of the product they are searching for in the search bar, we have two ways provided to give the input either as a text search or as a voice search, we use Natural Language Processing

concept of 1speech to Text conversion using Speech Recognition package provided by Python which is used to implement the Front End.

Step 4: Once the input is given the search algorithm starts, which searchs the product name given in the database provided, the database contains the product name, and the location of the product i.e., the floor number, column number,row number and the rack/stack number of the product. Once the search starts the the input given is compared with the product name column and the following column with its location is given if its a match.

Step 5: If the product is found, it gives us the location of the product in 2 ways one by speaking out loud i.e., audio format or by displaying the location on their screen. If the product is not found we will be getting the output as "Product Not Found" and ends the process.

Step 6: The user can follow the given location and find the product they are looking for.

Step 7: Once the user has got the one he/she searched for, they can move on with their next search.

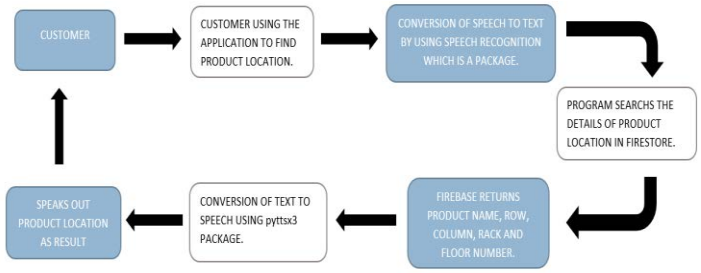
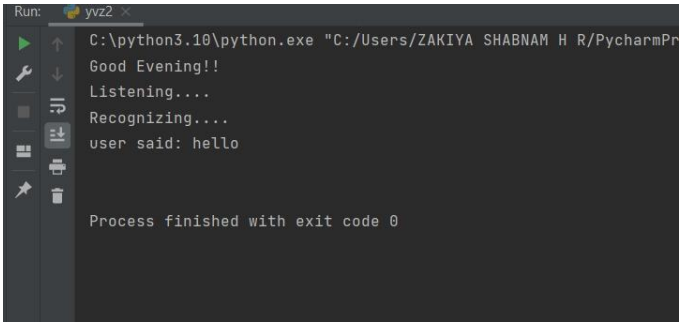


Fig a.Methodology used for developing the voice assistant.

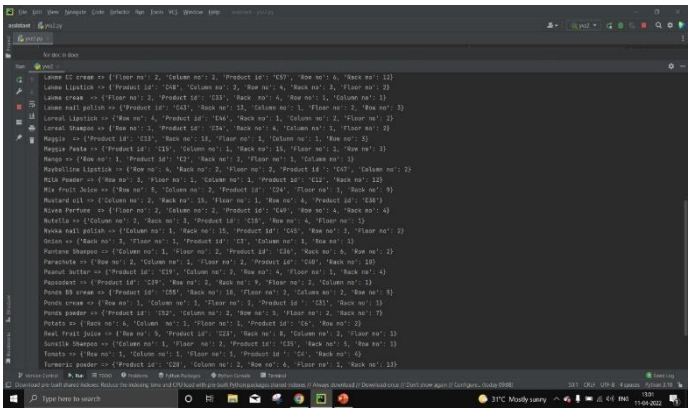
X. RESULTS

Here are the desired results from the Voice Assistant:

Initially, it shows the result of Greeting and Conversation with the customer to take the input from them also,



Finally, the results obtained upon working on the query is, it shows the Product Name, Rack number, Column number and also the Floor number as show below,



XI. CONCLUSION

In our proposed solution, we will be developing a voice assistant using natural language processing. This voice assistant can be used in shopping marts or malls to find out the location of variety of products available in the mall instantly just by saying the name of the product, thereby giving importance to the utilization of time in a conscious manner, i.e the searching time for the product is considerably reduced. This voice assistant also helps the visually impaired and introverts to shop offline in a much more simpler and easy way as it completely eliminates the concept of seeking help from the staff.

People usually find it uncomfortable to ask for help to the staff in the malls to locate certain personal products like sanitary pads. In such cases people can just make use of this voice assistant.

In times like COVID-19 and such similar situations where people are scared to get the virus, this voice assistant is of great help and a relief too.

Thereby, this voice assistant is very helpful for the society.

XII. FUTURE SCOPE

In future we can further add many other features like adding all the varying range/variety of the products.

This can be also implemented in libraries so that instead of asking the librarian multiple times one can just go find it.

On a small scale we can add all the marts in a fixed area into our application but on wider scale we can even add all the marts in a particular city with their products location by having conditional branching and the datasets which includes the product and its location of those marts accordingly.

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AUTO-CLAIM CAR INSURANCE USINGDEEPLEARNING

GYeswanthReddy*School Of C S & EReva University*Bengaluru,INDIAgandhaveetir@gmail.com

GSuraj Reddy
School Of C S & E
*Reva University*Bengaluru,INDIA
surajreddyg@duck.com

HRaghavendraReddy
*School Of C S & E Reva University*Bengaluru,INDIA
raghavendrareddy1175@gmail.com

KHarishKumar
SchoolOfC S & E
*RevaUniversity*Bengaluru,INDIA
kharishkumar183@gmail.com

Neelam Malyadri
Asst.Professor
School Of C S & E
Reva University
Bengaluru,INDIA
neelam.malyadri@reva.edu.in

Abstract- Vehicle damage identification is a vital stage infilingaclaimforvehicleinsuranceafteranaccident.Damage detection is often carried out by the insurancecompany following an accident by dispatching a surveyor.After the accident, the at-fault driver, customer, or rentalcompanyshouldnotifytheinsurancecompany,thencallthepolice and file a police report, take photographs as proof,andsubmitalloftheirdocumentstotheinsurancecompany.Afterthislengthyprocess,theinsurancecompanywill send a surveyor to inspect your accident. As a result,thisprocesstakesalongtime,andsurveyorsmaydeceiveusor make mistakes during the survey. As a result, we'vesimplified the procedure. Our initiative will assist the guiltydriverincalculating assessmentand thecostofrecovery.

We do this through image processing, which aids in theidentificationofimagesaftertraining.Asweallknow,CNNexcels in image processing (Convolution neural network).Duringthisprocess,theresponsibledriverwillsnapphotographs and send them to our website, where they willbe processed. It will check the location of the damage, thedegreeofthedamage,anddeterminethe approximateamountthatthe driverorrentalindustrycanclaim.

Keywords- Face Recognition, CNN, Human Emotions.

I. INTRODUCTION

Claimleakageisatermused todescribethedifferencebetweenthe optimal and actual settlement of a claim in the vehicleinsuranceindustry.Weassistnegligentdriversandrentalcompaniesindeterminingtheamountofcompensationtheyareentitledtosimplybyuploadingphotosoftheirdamagedvehicles.Wealso wish to assistinsurancecompaniesbysaving time for them for this challenge, we are utilizing CNN(Convolutional Neural Network).CNNis excel entatimageprocessing, with an accuracy rate of over 80%. We're bringingthedamagedcarphotographstoCNNfortraining.BecausedatasetsfortrainingCNNareparticularlyscarce,weusedtheinternet tocompile a data collectionof wreckedcars. And,accordingtoCNN,wecandeterminewhetherit'sacarornot,aswellasthevehiclemanufacturer andyearofmanufacture.Imageprocessingaidsindeterminingthelocationand severity ofdamage. The severity of the damage aids us in estimating theclaimamount.

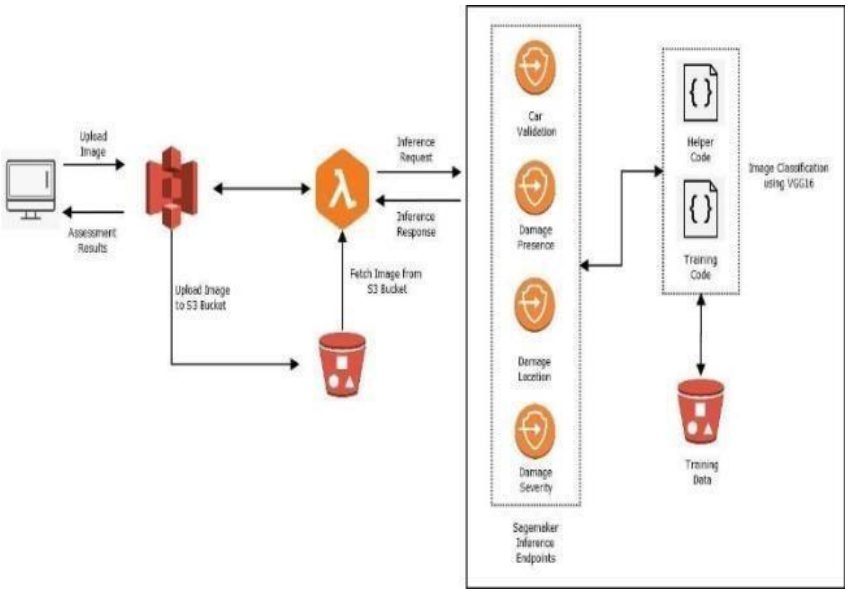


Fig1.Car ValidationProcess

LITERATURESURVEY

Numerousresearchontheidentificationofcardamagehavebeenconducted.Thebulkofthemployee oneofthesepre-trained models for feature extraction and categorization.Theyemploytransferlearningtoevaluatetheadvantagesofavailableobjectrecognitionmodels[1].InusesConvolutional Neural Networks (CNNs) toestimatethelevelof damage todamaged carimages.

According to [3,] an end-to-end system based on transferlearning and CNN models on an ImageNet dataset couldaccomplishvarioustaskssuchaslocalizationanddetection,butnotdamage assessment.

VGG16 and VGG19, deep learning-based algorithms forautomobiledamagedetectionand evaluation,areapplied toreal-world datasets inreference to [7]. VGG19 is moreaccuratethanVGG16, according to theirresearch, with a 95percentaccuracyrate.

It[8]ismostlyconcernedwiththeclassificationofautomobiledamage.Theyappliedafewdeeplearningapproaches,includingCNN trainingfromrandominitialization,ConvolutionAutoencoderpre-training,supervised fine tuning, and transfer learning. They usedmodels that had been pre-trained on a vast and diversedatasettoavoidoverfittingandfindsomanycrucialaspectsdue to the limitations of our dataset. They used a cutting-edgeYOLOobjectdetectionmodeltolocatethefault,earning the highest possible map rating of 77.68 on theentire testing dataset. In order to provide a more reliableassessment of vehicle injuries, they also provide a pipelinethat always integrates the categorization and recognitionduties.

II. OBJECTIVES

Following are the primary objective soft his project:

1. *Install avehicledamagedetectingsystemthatisautomatic.*
2. *Obtainingatrustworthyappraisalcalculationmethodology*
3. *Tousedeep learningbasedonAIforpictureprocessing.*
4. *Createa prototypethatcanbeemployedonalargebasis.*

Thefollowingarethegroundsforselectingtheaforementionedtopicforthisproject:

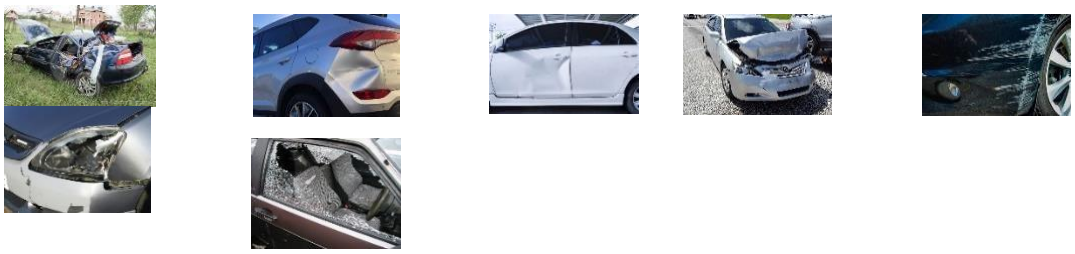
1. *To make it easier to spot vehicle damage during an insuranceinspection.*
2. *Toshorten thetime,ittakesto calculatedamage.*
3. *Providedriverswitha basiccostestimatefor damagerepair.*
4. *TocomprehendtheusageofDeepLearninginthefieldofdamagedetectionforpictureprocessing.*

METHODOLOGY

We generate do urown data collection that includes photographs of various types of car damage because there is no publicly available dataset for vehicle damage classification. Bump rod, door, glass fractures, head light breakage, tail lamp breakage, scratching, and cracking are all examples of frequent damage. Additionally, we have gathered photos that are categorised as non-abrasive. The photographs were gathered from the internet and then customised. Data augmentation It is well known that enlarging the database with transformed photos improvestheseparator'snormal operation.[6]

As a result, use performance to grow the database. Bymixing it with a random rotation and a horizontal rotationroughly five

times the database was randomly partitionedfor the classification research. 80 percent was utilised fortraining, while the remaining 20 percent was used fortesting.



Crashed Bumper Dent | Glass Damage Headlight | SideDoor | Front DamageScratch

Fig2.Samples Of Cars Damaged Locations

Classification of the Damages:

Following the uploading of images by the negligent driver ortherentalindustry,damage classification isperformed.

A. Findingacar:

It will compare the data to the automobile data set to see if it isa car or not. If we upload a picture of a car, it will move on tothe next phase; if we upload a picture of a bike or any othervehicle, such as a bus, it will stop the process. It will demonstratethatthe outputisnota car.

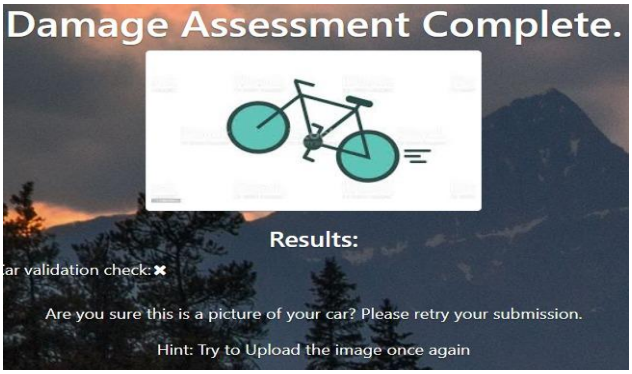


Fig3.ValidatingCarOrNot

B. Findingthatit'sdamagedornot:

It will examine whether the automobile is damaged aftervalidating that it is a car. It will compare the data set of notdamaged automobiles to the data set of not damaged carsand, if they match, it will display the result as "car is notdamaged.".

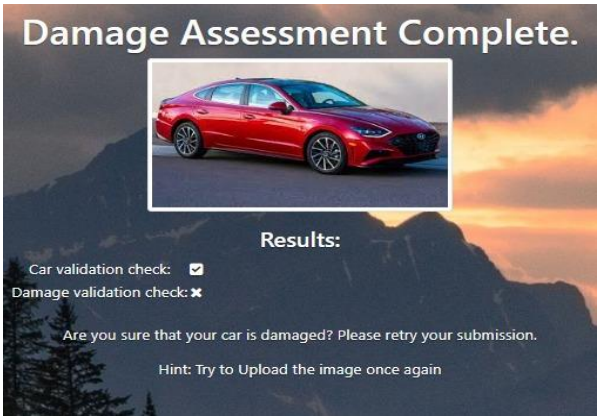


Fig4.ValidatingDamagesOrNot

C. Findingdamagelocation:

After determining that it is damaged, the second process willdetermine where the damage is located. It doesn't matter if it's abumper,window,ormirror.Itwilllocatetheposition an displayit as front bumper if the front bumper is damaged, and similarlyforall other parts.

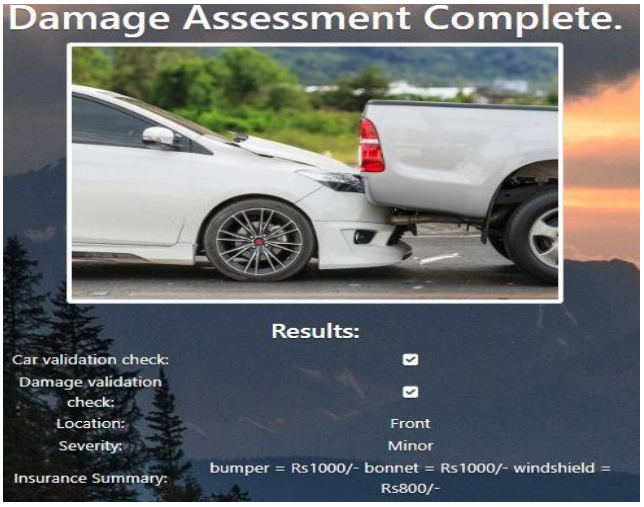


Fig5.ValidatingDamageLocation

D. Severityofdamage:

It will assess the severity of the damage after locating thespot.Therearethreetypesofseverityin thiscategory.

a. Extremelysevereharm

b. Damageofmoderateseverity

c. Damageisnotsevere.

1. Heavyseverityofdamage:

In severe damage scenarios, the damage should be severe;for example, if the front side of the car is completelydestroyed,the damage willbesevere.

2. Mediumseverity ofdamage:

Ifitisconsiderablydamaged,suchasifthesidedoorisbroken,itwillbeclassifiedasmoderatedamage.

3. Lowseverityofdamage:

Onlyscratches, mirrordamage, glassdamage, andotherminorproblemswillbe visible.




E. Estimationofclaimingamount:

It will estimatetheamount thataguiltydriver orrentalindustrycanclaimafterdiscoveringthelocationandseverity.

III. TransferLearning:

When there was less data label on the transfer reading, the findings were positive. During the transfer Information froma source function is passed to the target function in a learning system. The notion is that some information is unique to eachdomain,whileotherinformationcanbesharedacrossdomains to help improve focused performance or activity. When the target source and target domain are unrelated, however,thetransferofforcemaybeineffectiveandleadtomalevolentbehavior. We employ CNN models from theImagenet database in our case. We believe the transfer to beveryusefulbecausetheImagenetdatabasecontainsanautomobile as a Class, which we strongly recommend bytryingnumerouspre-trainedmodels.ImageNethasasectioncalled. TheoutputoftheTargetfunctionfeature,i.e.photographs of motorvehicleinjuries,is thepre-trainedmodel. We subtract feature vectors from each network afterinserting photographs of car injuries. Following that, weinstruct line planning on these aspects. We experimentedwithitintwophases:SVMlineandSoftmax.Intheeventofaline, thechargeCvalueissetto 1foralltestsin theSVM.WeemployedtheAdadeltaoptimizationstrategyandentropylossesintheSoftmaxclassifier.Thekeywastrainedfor 100 epochs, and the best efficient model was chosen bycategory. We also train line dividers in extra feature setsbecauseaugmentationofdatamakescategorizationeasieringeneral.TableIIIdisplaystheprecision,accuracy,andmemoryof these pre-trainedmodels.

Resnet is clearly the most successful of all the previouslytrainedmodels.Inmostcircumstances,addingdataenhancesperformance.Duringtesting,itwasdiscoveredthattheSoftmax separator is more effective and faster to train thanlineSVM.

Surprisingly, the well-trained Google Net model, which waswell-designed utilising a car database, performed poorly. Itdemonstrates that simply car-related elements may be lessvaluable effective at recognising different sorts of damage. This effect could cause autoencoder-based system failure. Inadistributionofextensiveandvariableinputdata, emphasizes theeffectiverepresentationofthelearnedelement.Theambiguitybetweentheharmandthe'non-damage' categories appears to be the key to determining thewrong. This is understandable given that component damageusually only affects a tiny portion of the image, makingidentification difficultevenforthe viewer.

V. Conclusion:

WetrainedCNNbycollectingdatasetsontheinternetthatarenot publicly available. We presented a comprehensive studybasedonautomotivedamageaftertrainingtheCNN.Wetrieda variety of Deep Learning methodologies, including CNNtrainingfromrandomlaunches,pre-ConvolutionAutoencodertraining with strong supervised tuning, and transfer learning.We've discovered that the transfer reading has been reallyeffective. We also recognise that only some vehicle attributesmay be useful in determining damage classification. As aresult, the height of the feature representation learned in alargetrainingset ishighlighted.

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Grid computing virtual organisations and their geographic distances optimised for activity

S.Arthi, P.Anitha,P.Sasikala,M.Kamarunisha

Department of Computer Applications, Dhanalakshmi Srinivasan College of Arts and Science for Women,,Perambalur , 621 212, Tamilnadu, , India.

Email: arthi5625@gmail.com (**S.Arthi**) *Corresponding author:* S.Arthi

Abstract

Grid computing increase with computing platform that is a collection of heterogeneous computing assets associated with the help of a network across dynamic and geographically scattered employer to produce a distributed high performance computing infrastructure. Process optimization with optimal exploitation of heterogeneous resource accomplished by employing computational grid and service grid. In this work we present an explanation for carrier grid environment which distribute tasks to executors throughout the sector where time play vital role

Keywords: job optimization, provider grid, heterogeneous aid, geographical distance, virtual company.

Introduction

The Grid [1] is a unified computing platform which consists of heterogeneous sources(e.g. processors, statistics storages, catalogs, networks and sensors etc) over massive geographical areas that exhibit one of a kind availability patterns over the years because of administrative polices of different domain names. Computational Grids allow the sharing and aggregation of tens of millions of sources geographically dispersed across corporations and administrative domain names. They contain heterogeneous resources (desktops, work-stations,

supercomputers, fabric control systems (unmarried system photo OS, queuing systems, and so forth.) and guidelines, as well as applications (medical and engineering) with many requirements (CPU, I/O, memory, and/or community in depth) "' A service grid attempts to define, organize, and manage the dynamic combination of offerings, in order to enable relevant virtual business in open settings and flexible strong resource sharing in virtual enterprises..' In a grid setting, since the resources are held by multiple companies, each with its own control rules, use and pricing models, and each client has distinct priorities and price models, resources management and process scheduling become one of the key challenges in grid research. If you're looking for an alternative to traditional work scheduling in an operating system grid, you'll find it in the carrier grid, which specialises in utility carrier integration and facilitates multi-company collaboration. Human participation in a computational grid is unnecessary or seldom desired since the computational grid focuses on the computational issue and performs computational activities using computer systems. There are various services that need human involvement in service grid settings, outside those provided by computer systems. Humans, on the other hand, can't work without a break. It is for this reason that each company, especially for government institutions,

has set up a piece calendar machine to divide the operational day into working time and nonworking time. It's the ideal technique to make certain services accessible just on occasion. There are certain organisations that are on duty at a specific time, while others are taking a break. This is fortunate because of the difference in time zones. As a result of these temporal considerations, including the difference in time zone and paintings calendar gadget, scheduling in service grids might play an important role. This research provides a time-based optimization methodology for activity scheduling in carrier grid systems based on a review of the time management paradigm in workflow. .

Related work:

In the framework of the Grid architecture for Computational economy (GRACE), a disbursed computational economic system framework that is accepted enough to house various financial models and maps nicely onto the architectures for large, distributed structures, four distinct scheduling algorithms were developed for deadline and budget-limited scheduling with four different techniques, including a combination of price-time optimization and a combination of value and time optimization. Through a series of simulations, the researchers tested several different deadline and scheduling algorithms by simulating globally dispersed Grid resources and varying the range of users, deadlines, and budgets. When it came to molecular modelling for drug creation, grid technology was put to the test at the World Wide Grid (WWG) (global-huge Grid). [5]

One of the two models proposed by adaptive carrier grid task scheduling is that of estimating the completion time of job completions in the Grid. For tasks that need just one kind of carrier, the single-carrier version forecasts the task's ultimate touch time. A process running in a Grid that provides more than one service may be predicted using a model based on a couple of services. Predicting the total duration of a work is one of the main goals of this research. An activity's ultimate contact time is predicted in a Grid when only one kind of carrier is available. Using the couple of services version, you may estimate the time it will take to complete a Grid-based operation. The two sets of rules that utilise the predicted results to timetable tasks at each machine level and awareness stage. Genetic algorithms may be used in software-degree scheduling in order to reduce the average finishing touch time of projects. The economics model suggested by Buyya et al. [6] incorporates advertising concepts, commodity marketplace, published price modelling, negotiating modelling, contract online modelling, public sale modelling, and other techniques to govern and schedule Grid resources. The Nimrod device had scheduling algorithms for time and cost optimization. Object-oriented middleware components Enactor, Scheduler, and collection are used to handle Legion's assistance [6]-[12].

Job scheduling framework on service grid

Layered service grid design is seen in Fig. 1. Virtual Organization level, Grid level, Admin Domain level and Node level are the four tiers of the architecture logically. All of these options are available at the Node level. Nodes belonging to the same organisation may be found in Admin Domains (AD) at this level of administration.

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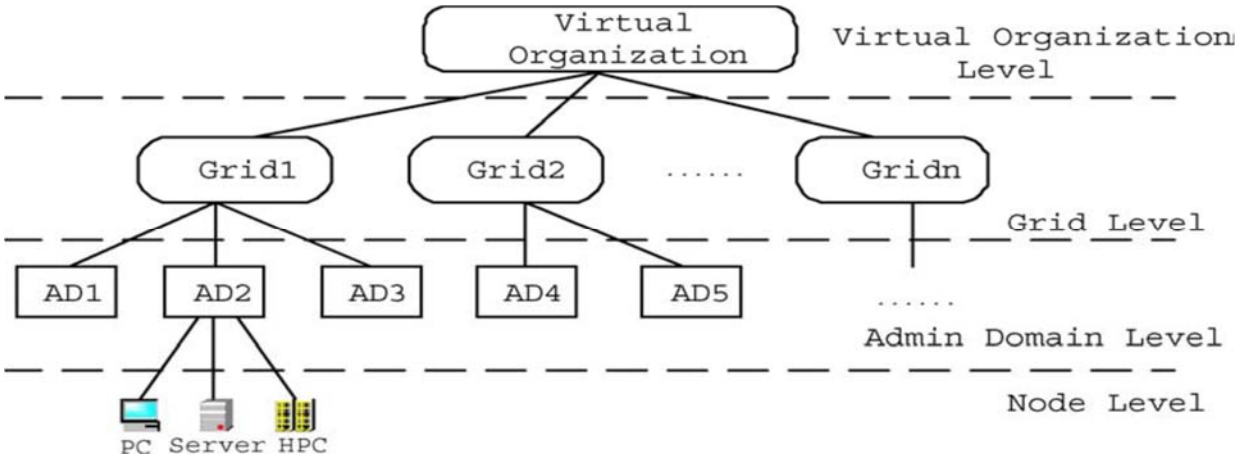

Fig. 1. The layered architecture

As shown in Fig. 1, AD1 is part of the laptop centre, whereas AD2 is part of the computer technology department. On the one hand, every advertisement may be seen as a complete device with a single aim shared by all of its nodes. Ads may, however, operate the sources of their nodes from a single location while being unable to do so from several locations.

In this picture, all nodes within the same ad are working together cooperatively. With the help of a Grid, you may connect a large number of advertisements, collaborate precisely, and accept the relationships between them as accurate. Fig. 1 shows two grids, one in London and the other in California. Grids, on the other hand, are impartial and allow users to assign tasks to a Grid via its Portal. At this level, all Grids are brought together into an integrated virtual business (VO).

Simplification

It is difficult to find a task scheduling process model because of the wide range and complexity of the mission objectives in an activity. Fortunately, classifying different go with the flow kinds of missions makes them easier to manage. Flow samples may be categorised into serial and parallel patterns, respectively. "AND-parallel" and "OR-parallel" are two further types of parallel samples. Fig. 2 depicts each of them. Challenge This pattern is known as a serial sample, while the assignment of T4, T8, and T10 represents a parallel sample. We use the term "block" to describe the scheduling optimization of undertakings.

Every sample will be "encapsulated" into a "block" and each "block" will be represented as an unmarried node in the flow iteratively is shown in fig 3. As a result, the following is the final result. Prior to blending D4,D3, and D8 into a diagonal pattern of the block B1 in the parallel obligations, D4, D3, and D8 are blended into a diagonal pattern block B1 in the parallel sample. The serial pattern block B2 is composed of the following serial responsibilities: T3, B1, and T9. Pattern B2 is combined into a single block. As a result, B3 is formed by combining T4 with T8 and T10. Finally, B4 was formed by combining the two simultaneous jobs B2 and B3. In the end, as shown in Figure 3, a is created.

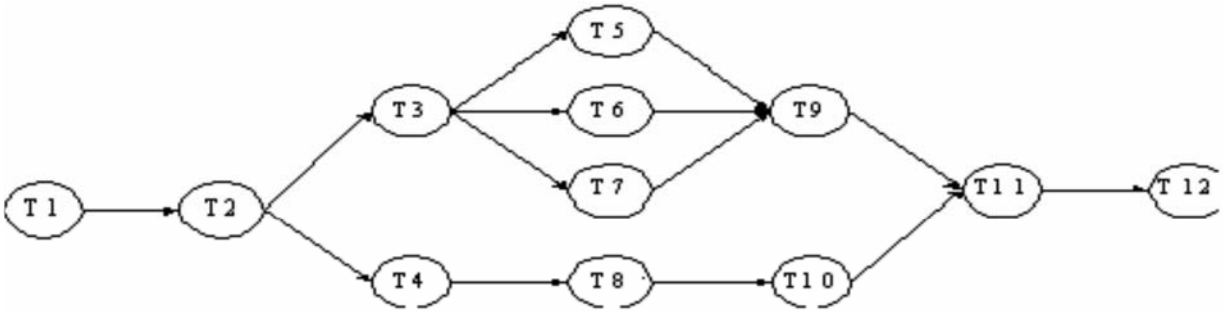

Fig. 2 task scheduling process flow

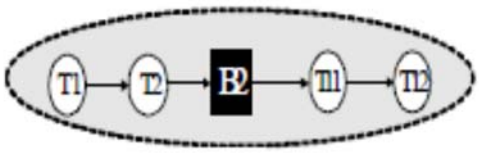

Figure 3. Serial task flow

Responsibilities, i.e., task= {Task1, Task2, Taskn}. And to better create the process scheduling model and optimize it, we specify various parameters

WTij = (24- Dj)* ET ij / Dj + rest1j * f(x1)+ rest2j *f(x2)

An example:[7]Assume there are five stations for handling duties, i.e., s1, s2, s3, s4 and s5. Let's look at what happens. There are two time zones: Greenwich Mean Time (GMT) and Eastern Standard Time (EST). Station s2 is located in California, which utilises Pacific Standard Time, which is 8 hours ahead of GMT in the United States. The station, s3, is located in New York City, which is Eastern Standard Time (EST) and five hours behind GMT. s4 is 8 hours ahead of GMT in Beijing in China. from 8 to 12 in the morning and 13 to 17 in the afternoon in the alternative 3 stations. The move with the flow officially begins at 10 a.m. GMT. According on the given assessment, we may expect is shown in fig 2: The float begins at 10 a.m. GMT. As a result of this examination, we may conclude that: T1, T2, T3, and T4 may be completed in five hours, and the stations that do these tasks are s2, s1, s5, s5.

Unless we leverage the time difference and do all of our tasks at one station, the total execution time may exceed 9 hours for all stations. The most appropriate scheduling model, thus, may be really advantageous and logical.

Ts = 10;

$H_1=0; H_2=8; H_3=5; H_4=-8; H_5=-3;$

$t\ min_{11}=9; t\ max_{11}=12; t\ min_{21}=13;$

$t\ max_{21}=17;$

$t\ min_{12}=8; t\ max_{12}=12; t\ min_{22}=14;$

$t\ max_{22}=18;$

$t\ min_{13}=9; t\ max_{13}=12; t\ min_{23}=13;$

$t\ max_{23}=17;$

$t\ min_{14}=8; t\ max_{14}=12; t\ min_{24}=14;$

$t\ max_{24}=18;$

$t\ min_{15}=8; t\ max_{15}=12; t\ min_{25}=13;$

$t\ max_{25}=17;$

$ET_{11}=2; ET_{12}=1; ET_{13}=2 ; ET_{14}= 3;$

$ET_{15}=4 ;$

$ET_{21}=1; ET_{22}=3; ET_{23}=2 ; ET_{24}= 3;$

$ET_{25}=5 ; ET_{31}=4; ET_{32}=2; ET_{33}=2 ; ET_{34}= 1;$

$ET_{35}=1 ; ET_{41}=5; ET_{42}=3; ET_{43}=4 ; ET_{44}= 4;$

$ET_{45}=2 ;$

Conclusion:

Tasks may be distributed among people all across the globe using Evince grid. Since there are various time zones and operating calendars for autonomous organisations, some groups may be on duty at the same time as others are off work at a certain time factor. That's why this research developed a mathematical model to address the issue of challenge scheduling completing touch time optimization in certain situations. An evaluation of a case study shows that the full execution period of the project may be decreased significantly when compared to the conventional situation. A greedy algorithm will be used to determine the fastest execution time. MatLab 2021 is used as the programming tool in our project.

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